

# THE ATHENÆUM

Journal of English and Foreign Literature, Science, and the Fine Arts.

No. 766.

LONDON, SATURDAY, JULY 2, 1842.

PRICE  
FOURPENCE.  
(Stamped Edition, 5d.)

For the convenience of Subscribers residing in remote places, the weekly numbers are reissued in Monthly Parts, stitched in a wrapper, and forwarded with the Magazines.—Subscriptions for the Stamped Edition, for the Continent, for not less than Three Months, and in advance, are received by M. BAUDRY, 3, Quai Malaquais, Paris, or at the Athenæum Office, London. For France, and other Countries not requiring the postage to be paid in London, 25fr. or 12 s. the year. To other Countries, the postage is additional.

**MR. JOSEPH DE PINNA** begs to announce that he continues to give INSTRUCTION in SINGING and the PIANO-FORTE, at his Residence, 15, Tavistock-square.

**A GENTLEMAN**, the Engineer of a Public Work now completed, is willing to take a PUPIL, to be INSTRUCTED in some of the Duties of a CIVIL ENGINEER. He would probably have by this means an opportunity of speedily establishing himself on the work as Assistant Engineer. A premium will of course be required.—Address B. B. D., G. H. Street, 11, Serle-street, Lincoln's Inn.

**CLERGYMEN, SCHOOLMASTERS**, or others properly qualified, may, through the assistance of the Advertiser, obtain one or other of the undermentioned Degrees from a celebrated Continental University, viz. Ph. D., A.M., L.L.D., D.D., D.T., or M.D.—Address (pre-paid), including stamp, and stating qualifications in full, to M.D. Messrs. Nock's, Booksellers, 15, Tottenham-court, New-road.

**A LADY** is desirous of ENGAGING as GOVERNESS in a Family, and undertakes to instruct in Music, Drawing, with Perspective, Latin, Italian, French, Botany, and the usual requirements of cultivated Education. She would prefer accompanying a family to the Continent, or any of our Colonies.—Address M.D., Post-office, Islington.

**EDUCATION**.—Terms, Six Guineas per Quarter. At MINERVA HOUSE, STAMFORD HILL, Middlesex, YOUNG GENTLEMEN are liberally boarded and carefully EDUCATED by Mr. S. FROSTON, who has been 35 years a teacher in the profession. The above-named charge includes Board, Education, Washing, &c., with instruction in the English and French Languages, Arithmetic, Algebra, and the Elements of the Mathematics; the Elements of Natural and Experimental Philosophy, Chemistry and Astronomy; Geography, History, Writing, Drawing, Singing, and Gymnastic Exercises. An instruction of the accommodation, and an inquiry into the treatment and mode of instruction, are respectfully solicited. School recomences July 13.—Omnibuses from the Flower-pot, Bishopsgate-street, every half-hour.

**EDUCATION at ISLINGTON**.—A few YOUNG LADIES can be RECEIVED as BOARDERS at an Establishment in the above neighbourhood. The situation is highly salubrious, and distant about three miles from the Metropolis. A limited number only being taken, the Pupils will, in the prosecution of their studies, have the advantage of the personal superintendence of the Principal, assisted by Masters of first-rate talent and experience. Terms, 20 and 25 Guineas per annum. References of the first respectability can be given. Prospective forwarders to beg part of the Kingdom on application (pre-paid) to X. Y., Post Office, 12, Duke-street, Manchester-square; or 11, Curzon-street, Chancery-lane.

**COMMERCIAL SCHOOL, GOTHIC HALL**, ENFIELD, Middlesex, by T. WEARE, Son and Successor to the late Mr. Weare. T. Weare acknowledges with gratitude the long-continued patronage of his numerous scholars. He respectfully invites a personal inspection of his school and premises, and begs to inform his friends and those parents who are desirous of combining domestic comfort and liberal treatment with a sound and useful education, that he continues to receive Pupils on his usual moderate terms. Accommodation for Parlor Boarders.—The present Vacation will terminate on the 10th instant.

**A MARRIED GENTLEMAN**, B.A., of Trin. Coll. Cambridge, residing at Hampstead, wishes to RECEIVE into his Family a few YOUTHS to prepare for the Universities, or any profession for which a liberal education is required. His course of instruction includes the Classics and Mathematics, and the French and German languages. His religious principles are those of an unprejudiced and evangelical member of the Church of England, and his views on the subject of mental training are of the highest order. His religious Taylor's work, entitled "Home Education," Terms, 50s. per annum. References and testimonials of the highest respectability can be afforded. Address to A. T., Downshire-hill, Hampstead.

**EDUCATION in GERMANY**.—A PROTESTANT CLERGYMAN, a native of Saxony, who has been appointed by the Government Director of an Institute, RECEIVES into his House a limited number of PUPILS. He is assisted by Professors and Masters of the first eminence. The studies include the German, French, and Italian Languages, the Latin and Greek Classics, Mathematics, Arithmetic, and every branch necessary to form the education of youth. The domestic arrangements are under the superintendence of an English Lady, the wife of the Director. The highest references given. An English Gentleman, returning shortly to Germany, has offered to take charge of pupils. For cards of address, &c., apply to Messrs. Hatchard & Son, 17, Piccadilly; Mr. F. Roland, 20, Berners-street, Oxford-street; or Messrs. J. L. Ewer & Co., Newgate-street.

**SCHOOL PREMISES**.—TO BE DISPOSED OF, the best-arranged PREMISES in BRIGHTON for a SCHOOL. The school and household appointments are perfect, will accommodate upwards of an emigrant, two Masters, and a Matron; a large play-ground. The desirable private residence attached is appropriate for the Conductors of such an Establishment, and has a garden with a green, a lawn, a flower garden, a medium-sized pond, and a paddock. More land may be had if required.—For particulars apply to Mr. Fry, Tockington, near Bristol.

**GLOUCESTERSHIRE**.—MILES FROM CLIFTON OR BRISTOL: 3 FROM THE OLD OR NEW PASSAGES.

**TO BE LET ON LEASE, OR SOLD**, with immediate possession, a Commodious Modern-built MANSION, delightfully situated, commanding a fine picturesque and extensive views of the Welsh Hills and Bristol Channel, well adapted for a gentleman's family of the highest respectability; comprising, on the ground floor, noble entrance hall, two dining-rooms, a library, large kitchen, back-kitchen, and Brewhouse; a plentiful supply of both sorts of water; two cellars, one underground, and a pantry; a second-floor room, a drawing-room; water and other closets; double coach-house, with servants' room or laundry over; four-stalled stable, with other convenient out-houses; two good fruit and kitchen-gardens, well stocked with trees and fruit; a large paddock, and a paddock. More land may be had if required.—For particulars apply to Mr. H. Fry, Tockington, near Bristol.

**HORTICULTURAL SOCIETY OF LONDON**. EXHIBITIONS at the GARDEN.—The last Exhibition will take place on SATURDAY, the 9th of July; subjects for Exhibition must be at this Office on Friday, the 5th of July, or at the Garden before half-past Eight o'clock, A.M. on the day of Exhibition. The gates will be opened at One o'clock. Tickets are issued to the Metropolitan. The Council of the Society are desirous of the afternoon of the day of Exhibition, at 10s. each; but none will be issued without an order from a Fellow of the Society.

**ORNITHOLOGICAL SOCIETY OF LONDON**, Established 1837. It is presumed that the public are ignorant of the fact, that the Aquatic Birds upon the Lake in St. James's Park have been collected by a very small Society of Gentlemen, calling themselves "THE ORNITHOLOGICAL SOCIETY OF LONDON." This Association, whose Members contribute the moderate sum of One Guinea each, annually, has been able, under the active protection and assistance of Her Majesty's Commissioners of Woods and Forests, to form and maintain an extensive and interesting assemblage of Birds, and thus to contribute largely to the information and amusement of the inhabitants of the Metropolis. The Council of the Society are desirous of extending their collection to the water in Hyde Park and Kensington Gardens, as well as to increase it generally, but are restrained by their very limited funds. It is hoped, therefore, this statement of their exertions and objects may have the effect of enrolling among their contributors all who feel an interest in their pursuit, and in the amusement of the public generally, more especially of the young, in the study of Ornithology.

Prospectuses may be obtained at the Cottage of the Society in St. James's Park; and of the Keepers at the Lodge, Victoria and Kensington Gates, Hyde Park.

**DAGUERRETYPE PORTRAITS**, under the patronage of Her Majesty and the Nobility, are taken daily at the ROYAL ADELAIDE GALLERY, Lowther Arcade, Strand, by Mr. CLAUDET'S instantaneous process. The sitting generally occupies less than one second of the operation, so is instantaneous that he can now with facility take portraits of infants, and even correct likenesses of horses, dogs, and other favourite animals. Some of the finest of Her Majesty's horses have lately been taken by him with singular fidelity and beauty. Mr. Claudet's portraits are taken with backgrounds representing landscapes, interiors of apartments, &c., and are fixed by a peculiar process which prevents their changing colour or being easily rubbed off.

**Sales by Auction**. IMPORTANT COLLECTION OF RARE SHELLS. Messrs. J. C. & S. STEVENS beg to announce they will SELL by AUCTION, at their Great Room, 38, King-street, Covent-garden, on WEDNESDAY, 6th July, and two following days, THE CABINET OF CHOICE AND VALUABLE SHELLS of an eminent Collector at Paris, comprising upwards of 13,000 Specimens, many of which are of very unusual occurrence, and the chief part are in the finest possible state.

May be viewed two days prior to the Sale, and Catalogues had.

**SOUTHGATE'S ROOMS**. PREPARING FOR SALE.

**MESSRS. SOUTHGATE & SON** beg respectfully to announce that they have received instructions from the Assignees of Mr. HENRY LACKY, of Liverpool, to prepare for immediate Sale the whole of his very extensive STOCK IN TRADE.

An Extensive Collection of BOOKS in Boards and Quires; consisting of many valuable Reminders, Stereotype Plates, &c. &c.

A Miscellaneous Collection of BOOKS, including some of the best Works in History, Biography, Topography, Voyages, Travels, Law, Medicine, Arts and Sciences, and General Literature, &c. &c.

\* Valuations made of Libraries, Office Furniture, &c.

135, Fleet-street.

**20,000 VOLUMES OF BOOKS**.

Mr. L. A. LEWIS has nearly ready for SALE by AUCTION.

**A VALUABLE COLLECTION OF BOOKS**, in quires, boards, and bound, including Shakespeare's Plays, Notes by Valpy, beautifully printed, in 14 vols. post 8vo. on a thick paper, 250 copies—Shakespeare's Poems, uniform, 250 copies—Loney's superb work on Foreign Cathedrals, large folio, 15 copies—Sir W. Gell's splendid work on Pompeii, 4 vols. numerous copies—Antiquarian Repository, by Gross & Auld, 4 vols. 7 copies—Bibles, 18mo. and 24mo 250 copies, in mor.—Common Prayer, 32mo. 430 copies, in quires—Ditto, 32mo. and 16mo. numerous copies in mor.—Goldsmith's Ancient Greece, 4 vols. 24mo. 500 copies—New Testament, 500 copies—Hume's Guide to Continental Watering Places, 800 copies—Stebbing's Sacred Classics, 18 vols. morocco, 6 sets—Goldsmith's Poems, 1000 copies—Don Quixote, royal 8vo. 150 copies—Walker's Pronouncing Dictionary, 100 copies. Also Lodge's Illustrations of Portraits, 4 vols. folio, large paper, India proofs—Ditto, folio, 111 and 112 vols. small and large paper—Taylor's Greek & Gothic Architecture, 2 vols.—Belin's Anatomy of Expression—Coke's Voyages, 9 vols.—Encyclopaedia Metropolitana, 20 vols.—Cowper's Works, by Southey, 15 vols. &c. &c.

**ARCHITECTURAL and other BOOKS**; including Lewis's Sketches of Constantinople, coloured—Hamilton's Campi Phlegrei, 3 vols.—Meyrick's Ancient Armour, 3 vols.—Dary's Architecture—Antiquities of Suffolk—Winklemann Monumental Architectura Inedita, 3 vols.—Portraits of the Poets, 2 vols. India proofs—Halfpenny's Cook's Ornaments—Goldwin's Rural Architecture, 2 vols.—Pugin's Gothic Architecture, 2 vols.—Belin's Anatomy of Expression—Coke's Voyages, 9 vols.—Encyclopaedia Metropolitana, 20 vols.—Cowper's Works, by Southey, 15 vols. &c. &c.

**THE LIBRARY of a GENTLEMAN** lately deceased.

An EXTENSIVE COLLECTION of BOOKS from the Country.

A SECOND PORTION of the RETAIL STOCK of the late Mr. D. A. TALBOYS, of Oxford.

**HECTOR O'HALLORAN**.—Subscribers and the Public are informed, that the publication of Part IV. of this Work, owing to the indisposition of the Author, is POSTPONED until the end of July. s, New Burlington-stre., June 30, 1842.

**NEW BOOKS and STANDARD WORKS**, FOR PERUSAL. Sent to all parts of the Country, and in any quantity, from THE PUBLIC LIBRARY, CONDIT-STREET, HANOVER-SQUARE, LONDON. TERMS and HINTS for the FORMATION of READING and BOOK SOCIETIES sent GRATIS and POST-FREE on application to Messrs. Saunders & Oley as above.

**CHURTON'S LIBRARY, 26, HOLLES-STREET**.—The whole amount received for Subscriptions to this Library is expended in the purchase of New Publications, British and Foreign.—the sale of the Duplicates, and they have gone through the Library, being an ample remuneration to the Proprietor. Country Libraries supplied with Duplicates. Terms.—The Year, 4s. 6d., 5s. 6d., or 10s. 10s.

**BULL'S NEW SYSTEM**, AND JULY POST CATALOGUES: Describing about Seven Thousand Volumes of the Valuable and interesting Modern Works published in July, and the advantageous Terms on which Families, Reading Societies, and Book Clubs are regularly supplied with whatever New and Standard Works, Magazines, and Reviews they may desire for Perusal, which are sent in any quantity throughout England, Scotland, and Ireland. Apply for the above to Mr. BULL, English and Foreign Public Library, 19, Holles-street, four doors from Cavendish-square, London.

**HENRY G. BOHN**, Bookseller, of No. 4 and 5, YORK-STREET, COVENT GARDEN, finds it necessary to state, that he is not in the least degree connected in business with any other establishment of the same name, and that his is not the firm advertised as retiring. To prevent mistakes, HENRY G. BOHN begs that his Christian name and address, YORK-STREET, may be observed in favours intended for him. His Stock is by much the largest and finest in Europe, and the books all marked at moderate prices. His General Catalogue may still be had on the terms constantly advertised. YORK-STREET, COVENT GARDEN.

**THE BRITISH and FOREIGN MEDICAL REVIEW**.

Edited by JOHN FORBES, M.D. F.R.S. F.G.S. No. XXVII. for JULY, price 6s. London: John Churchill, Princes-street, Boho.

**FRASER'S MAGAZINE for JULY**.

Price 2s. 6d., contains: The Great Reformation of the Sixteenth Century.—De Re Vehl-cant, Chap. 10. De Materie et Formis, &c. &c. or, the Anatomy of a Character.—Some Notices of the Shakespearean Drama, Shakespeare, and his Commentators. By an Apprentice of the Law. Part II.—Fitz-Boodle's Professions.—Homeric Baldhead. William Magdon, L.L.D. No. 2. The Genealogy of Æneas.—Precious Minutes; or, Past Half-Hours.—The Love Epistles of Aristarchus. Edited by a Templar.—The Dead Alive. An Inquiry. By Bon Gaultier. Dramatic Tragedies.—Richard Brinsley Sheridan.—Wherein lies the Chief Obstacle to the Working of a Conservative Government.—The German Opera. By Morgan Rattler.

G. W. Nickolson, 215, Regent-street, London, (Successor to the late James Fraser.)

**EDITED BY THOMAS HOOD, ESQ.**

Illustrated by LEACH.

**THE JULY NUMBER OF COLBURN'S NEW MONTHLY MAGAZINE and HUMORIST**.

Contains the following interesting Articles:—

Diabolical Suggestions. By the Editor.

The Little Brownie. By the Editor.

The Barnaby in America. By Mrs. Trollope. Chapters 13, 14, 15, and 16. Illustrated by Leach.

Contributions to the Income Tax.

Reminiscences of a Medical Student. No. VI. Romance of a Walk.

On the Perception of Danger.

Phineas Quiddy; or, Sheer Industry. By John Poole, Esq., Author of "Paul Pry."

Desaga; a Fantastic Tale, after the manner of Hoffman. By Captain Medwin.

Graduates and Under Graduates; or, The Proctor's Note-Book. By the Author of "Peter Frigins." No. X. A Day's Courseing at Woodstock. By the Editor.

Some Remarks on the "Saum cuique."

The Sculptor of Avignon. By Elizabeth Youatt.

Epigrams on the Editor of "Discovery." Literature of the Month, &c.

Henry Colburn, Publisher, 13, Great Marlborough-street.

**ARMY and NAVY.**

**THE JULY NUMBER OF COLBURN'S UNITED SERVICE MAGAZINE**

and NAVAL and MILITARY JOURNAL, contains

Naval Improvements in the 18th Century.

British Arms, as they were, and as they are, compared with those of the Foreigners.

Military Law.

Admirals Mathews and Les-

scott.

Scenes in America, from a Tyro's Note-Book.

A Soldier in Calabria, a Military Reminiscence. By an Old Soldier.

Encounter with Bush Rangers in Van Diemen's Land. By an Officer.

In Fort after Action, a Sketch from the Diary of a Soldier.

Memor of the late Sir William Nicolay.

Henry Colburn, Publisher, 13, Great Marlborough-street.





LONDON, SATURDAY, JULY 2, 1842.

## REVIEWS

*Travels in Kashmir, Ladak, Iskardo, &c.* By G. T. Vigne, Esq., F.G.S. 2 vols. Colburn.

WHEN Mr. Vigne, frustrated in his design of exploring the northern confines of Tibet, returned down the Indus to his former host, Ahmed Shah, who rules the remote valley of Iskardo, that intelligent chief received him with his habitual hospitality; "but," adds the author with most ingenuous frankness, "he could not repress a smile, in which I joined him, at my having run up and down so many miles of the Indus, to so little purpose." We enter heartily into the feelings of the chief of Iskardo; and, after a careful perusal of our author's volumes, we cannot help smiling at the vast disproportion between his physical labours as a traveller, and their results now laid before the public.

We do not, indeed, expect every traveller to be a Pococke or a Shaw, a Humboldt, Stevens, or Trebeck; nor would it be fair to refuse a word of praise to the bold enterprise and spirit of inquiry which prompt our countrymen to visit all the strange and almost inaccessible nooks on the earth's surface; but we must warn those erratic gentry, that the mere chronicles of their wanderings have but little interest for mankind in general; they must not think of scouring the field of literature in thoughtless haste, or of running up the hill of fame as if it were a vulgar mountain. Narratives compiled from note-books and journals, without sound learning, correct grammar, ingenuity, or the glow of thought, are very dull reading indeed. There was a time when it was thought a serious matter to come before the public as an author, and when the man of travels anxiously sought the assistance of the man of letters before he ventured to publish. It was thus that Vaillant, himself a creole, and unable to write, or even to speak, tolerable French, yet contrived to present to the world narratives of his travels, remarkable for their attractive and fascinating style. But now, there is no caution in such matters; the man who has trudged some hundred weary miles, feels himself privileged to inflict as many tedious pages on his readers, and breaks Priscian's head as unconcernedly as if it were the granite head of a Sphinx or of a Memnon.

When Mr. Vigne left England in 1832, it was his intention to travel for twelve months, he knew not exactly where, but certainly he never thought of visiting the north-western frontier of India, nor did he ever dream that seven years would elapse before his return home. Of his route by Trebizond and Syria to Basrah and Bombay, he gives no particulars; his journal, indeed, may be said to commence with his entrance into the Hill-states of India, on his way to Kashmir. We shall not, however, suffer ourselves to be detained long by the attractions of this far-famed valley, but shall hasten to reach that portion of the valley of the Indus which our author was the first to visit. We shall, therefore, barely call attention to the picturesque town of Mundi, adorned by the labours of a Hindu Raphael, in which the goddess Kali is represented "smoking a hooker," as our author expresses it, "by way of whiling away eternity." But here also he witnessed a more interesting spectacle:—

"One morning my munshi came to me, and told me that a Sati (Suttee), or widow, who was going to burn herself on the funeral pile of her husband, was about to pass by the garden gate. I hastened to obtain a sight of her. She was dressed in her gayest attire; a large crowd of persons followed her, as she walked forward with a hurried and faltering step, like that of a person about to faint. A brahmin supported her on

either side, and these, as well as many around, were calling loudly and almost fiercely upon the different Hindu deities; and the name which was most repeatedly and most earnestly called upon was that of Jagannath; but I do not know whether they alluded to the great idol of Bengal, or to some local divinity. *Jugu* signifies a place, and *nath* is a Sanscrit word for lord, or master, applied to Vishnu, or Krishna. Her countenance had assumed a sickly and ghastly appearance, which was partly owing to internal agitation, and partly, as I was informed, to the effects of opium, and bang, and other narcotics, with which she had been previously drugged, in order to render her less awake to the misery of her situation. She was not, however, so insensible to what was passing as to be inattentive to two persons in particular, amongst several others who were stooping before her, and were evidently imploring her blessing:—they were probably near relations. She was presented at intervals with a plate of moist red colour, in which saffron was no doubt an ingredient, and into this she dipped the ends of her fingers, and then impressed them on the shoulders of the persons who stooped before her in order to be thus marked. In about half an hour the preparations were completed. She was regularly thatched in, upon the top of the pile, whilst her husband's body yet lay outside. It was finally lifted up to her; the head, as usual, and which is the most interesting part of the ceremony, was received upon her lap: the fire was applied in different parts; and all was so quickly enveloped in a shroud of mingled flame and smoke, that I believe her sufferings to have been of very short duration, as she must almost immediately have been suffocated."

On one occasion, Mr. Vigne offered a Sati at Lahore a sum of money if she would renounce her purpose; but no! the longing after immortality, or the liking for "spontaneous cremation," as our author calls it, made her deaf to his offers, and, in truth, she would have been deemed infamous had she retreated. We cannot agree with him in thinking that the burning of widows in India may be converted into an argument against Romanism; nor has he proved, in a manner satisfactory to our understandings, that the "spontaneous cremation" in question is not an act of supererogation. We recommend to his attention the fact that, not more than four or five years ago, a numerously signed petition from the natives of India was presented to parliament, deprecating any interference with the rites of Sati. In India, as well as in England, names exercise a great influence on the reasonings of the many, and, so long as the Indian widow, who voluntarily descends with her husband to the grave, is called a Sati (which means a virtuous wife), so long will there be an abundance of willing victims. If the Anglo-Indian government could contrive to render current some disparaging appellation of the rites of Sati, they would thereby do more towards the preservation of Indian widows, than any legislation can accomplish.

It was remarked by Moorcroft, that the barber surgeons of Western India have been long acquainted with the operation of couching the cataract. In like manner, our author discovered that the native practitioners at Kangra are famed for their skill in artificial noses, their mode of proceeding being exactly the same as that which has now become common in London. This operation is called by Mr. Vigne Nasotomy; but surely he might as well have called it noseotomy at once, since English and Greek may be as legitimately compounded together, as Latin and Greek.

To Kashmir, our author devoted much time; we know not, indeed, how much, for he describes the several passes into that valley without adhering to the order of his journal; but, unfortunately, there is nothing in his descriptions which is equivalent to the interest of a personal narrative; his pictures are generally obscure and colourless. His delineation of Lake Wulur (dif-

fering materially from the results of Baron Von Hügel's observations), and other geographical details in his map, convince us that he has not made a scientific survey of Kashmir; and as to the heights of mountains, measured, as he tells us, by the thermometer, we are quite incredulous. It is true that the elevation of a place may be ascertained by observing the boiling point of water, but it is not easy to make this observation in a satisfactory manner; and, as our author never alludes to any of the conditions required for it, and always gives his measured heights in round numbers (nothing less than 500), we cannot help concluding that he has imposed on himself, with the belief that the absolute elevation of places may in general be guessed from the local temperature of the air. He adds nothing to Moorcroft's vivid description of the capital of Kashmir, except the fantastical remark, that the little island of Chunar (the plane trees) on the lake "is too far from the Shalimar, for the nightingales to be heard there; but, from its central situation," he adds, "it would be an excellent place for a bust of Tom Moore, which I prophesy will sooner or later be placed there." The following notice of contemporaneous travellers in Kashmir and North-west India, is not without interest:—

"One evening, on my return from shooting wild ducks on the lake, I found that Baron Hügel, the well-known Austrian traveller whom I had expected for several days, had arrived at the Bagh-i-Delawar Khan. Upon entering his room in the pavilion opposite to that which I occupied, I was surprised to find there a person who had also that moment arrived, clad in the costume of Little Tibet, and whose whole appearance betokened exposure to the fatigues incidental to mountain travel. I immediately recognized in him the enterprising and enthusiastic Dr. Henderson, who had crossed the Sutlej at Belaspur, in the disguise of a Syud, for the purpose of exploring the countries on the banks of the Indus. He quitted Lodiana a short time before I did, in 1835, and at Khundalu made his *début* as a holy man, by professing to work a miracle. The peasants complained to him that all the fish in the lake had died from drought; upon which he told them that he was not the least surprised, but on the contrary was quite prepared for that intelligence, as Mahomet had appeared to him in a dream at Ajmir, and informed him that he would find it to be the case. He said, he knew that a copper-mine had burst under the water, and the fish had been consequently poisoned, but that he had no doubt that he could intercede with the prophet in their behalf. He then left them in the full reliance on his power and promises. He then visited Mundi, and passed by way of Zanskar or Lahoul to Ladak. He then set out for Iskardo, but was arrested at Kulutzi, and brought back by order of the Rajah of Ladak, as a suspicious character, and was released by Zurawur Singh, who had marched thither after having beat the Ladaki forces at Zanskar. He afterwards made his way to Iskardo, where he was most kindly received by Ahmed Shah, who, although the new snow had fallen, sent with him a sufficient number of men to escort him safely over the then dangerous pass of Alunipilah, whence he descended by Burzil or Astor to Guryah and Kashmir, where he joined us. It may easily be conceived that we were not a little delighted to meet each other on such an occasion, and in such far and inaccessible regions, and that we had each of us a vast deal to communicate. Poor Henderson left us again in the course of a day or two, in order to prosecute his journey into Bajawur, where his disguise as a Syud was not sufficient to prevent his being recognized as a Feringhi and plundered."

Dr. Henderson reached Bajawur, the capital of a Hill-state, west of the Indus, between Peshawar and Kafaristan. He was the first European who penetrated so far in that direction, where much remains to be explored; but fatigue and privation undermined his constitution, and reduced him to a feverish state, which terminated fatally in February, 1836. It appears,

from the following paragraph, that the advantages derivable from our efforts to lay open the natural means of communication in Western India are understood and appreciated by the inhabitants of Central Asia :—

"The Hajis from Kokan in the countries north of the Himalaya had heard that the Indus was opened, and that the shortest way to Mecca was by descending the river to Bombay. They arrived at Ladak and Kashmir by the Durass pass, and invariably proceeded to the house of the Shah Sahib, by whom they were hospitably entertained, and whom they recompensed by a present of tea, a piece of siling or cloth manufactured in Yarkund, from the shawl wool of Tibet; or a china cup, or a trinket made of the yu-stone or chalcodony of that country. I collected in this manner specimens of twenty or thirty different kinds of tea, and I never tasted finer than that which I have drunk at the Shah's house."

We shall now hasten forward to a newly, and, as yet, imperfectly explored region. "It was, previously to my first departure for Kashmir," says our author, "that I received from Capt. Wade, at Lodiana, a hint or two, which encouraged me to make the attempt, of my own accord, to continue my journey through the valley of Iskardo, the capital of Little Tibet, which had never as yet been visited by any European." Obedient to the impulse, he prepared to go northwards, "of his own accord." The Sikh authorities endeavoured to dissuade him, and to terrify his followers, by asserting that there are Jews in Ladak, whose favourite food is human flesh. "I was not aware at the time," says our author, "that this accusation of cannibalism was not without foundation." In explanation of this remark, he refers to a memoir published in a recent volume of the Asiatic Researches, in which it is stated, that the people of Bhutan eat the livers of those killed in civil war; they make flutes of the bones, and drinking-cups of the skulls of those who fall in battle. We are not sure that the native accounts translated in the memoir referred to, describe the manners of the present day; yet we do not think it at all improbable that Bhutan may preserve some traces of those solemn cannibal rites, which Rubruquis, in the 13th century, relates of Tibet in general, and which, probably, extended, in ancient times, over a large portion of Central Asia, since Herodotus ascribes similar customs to the Massagetae. Yet, after all, Bhutan is 800 miles from Iskardo; and if, besides, Mr. Vigne will give attention to the fact that he has had experience of the mild and humane manners of Little Tibet, where superstition is directly opposed to the shedding of blood, he will allow, we hope, on mature consideration, that the above-mentioned accusation of cannibalism was wholly without foundation.

Respecting the general impoverishment of Kashmir, the decrease of population and of revenue, consequent on its subjugation by the Sikhs, our author says nothing; nor does he throw any light on the moral opinions, the national feeling, or the refinement of a people whose social organization may be traced with certainty to very remote antiquity, for the history of the kingdom of Kashmir ascends beyond the twentieth century, before the Christian era. Respecting its feathered inhabitants, he is rather more communicative. Speaking of the innumerable water-fowl, which spend the winter on the Wular Lake, he says—

"Upon the breaking up of the frost, the wild fowl take their departure to the northward, topping in their flight the most elevated ridges of the Himalaya, and descend on the plains of Yarkund and Mogulistan, whence they came on the approach of winter. The Kashmirians would have me believe, that being somewhat out of condition for a long voyage, they rest for the first evening on the summits of the mountains around the lake, and that being instinctively aware of the difficulty they would have in finding a

supply of food in the sedgeless streams of Tibet, they carry with them in their bills from the lake a supply of singaras, and their resting-places for the night are denoted by the ground being covered with the shells. I do not vouch for the truth of this story. I have also heard—that is by no means unlikely to be true—that the wild fowl, in their first rising, skim the summits of the mountains so closely, that in one gully in particular, the natives conceal themselves, and knock them down by throwing sticks at them as they pass."

Birds, in crossing very high mountains, must necessarily skim their surface, because their ascent is limited by the rarity of the atmosphere. When Burnes states in his Travels that the migrating birds do not fly, but run, across Hindoo Koosh, he only relates the same fact in the language of exaggeration. We do not believe that the feathered emigrants from Kashmir take with them a large stock of the singara or water-nut; but their preliminary gathering on the mountains near the lake is in exact conformity with the general habits of the migrating tribes. A few years ago the swallows of the London district used to assemble every autumn in the fields near the Thames at Pimlico, west of Vauxhall Bridge, not to put themselves into condition for their departure, but simply to unite their forces. Driven from that locality by the growth of the metropolis, we know not whither they now resort; but certainly their councils and proceedings in choosing a new place of rendezvous would have afforded curious matter of observation to a naturalist. But it is time to proceed with our author to Iskardo :—

"When all was ready for a start on the morning, I was informed, that a messenger from Ahmed Shah, of Iskardo, had arrived, and wished to speak to me. He proved to be Nasim Khan, who is mentioned in M. Jacquemont's letters. A singular-looking person, thin, and pale-faced, dressed in a black velvet frock, with silver buttons, and wearing a black leathern belt, profusely ornamented with little knobs of the same metal. He approached me, bareheaded, with the look and manner of a captive brigand, his small, keen, and dark eye glancing suspiciously on my Sikh guards; and, after making a most respectful salaam, informed me, that his master had sent him to welcome and attend upon me; that he also, by his orders, brought with him a good pony or tattu, who would carry me in safety to Iskardo; and after handing me a letter of invitation from Ahmed Shah, he drew back and remained stationary, with an aspect and in an attitude that betokened the most profound submission. \* \* \* When all his fears and suspicions were over, his tongue was rarely at rest, and I listened with avidity and delight to the recital of his own adventures, (for he was, I think, a native of the Khyber pass, who had taken service with Ahmed Shah); his personal recollection of M. Jacquemont, and what he had heard of Mr. Moorcroft; his stories of little and great Tibet, and the countries on the north of us, including Yarkund and its Chinese masters; how they were ever at war with the Kokanis; how they had laboured for months to cut through a glacier, in order to form a passage for their army; how the general of the Kokanis had loaded several waggons with the pigtails of the Chinese soldiers, slain in action; and how, in return, his celestial majesty had sent back the same number of waggons laden with millet-seed, by way of intimating the countless number of his troops;—how a Chinese general, to prove his powers of ubiquity, would start off his whole army in carriages overnight, to a distant post; how these vehicles were sometimes drawn across the country by paper kites; how the walls of one of their strongholds were of loadstone; and how the advancing force were agast, when (fit subject for a pantomime) their side-arms flew from their scabbards, and their matchlocks struggled fiercely for the encounter; how beautiful were the Turki women, and how, when a merchant came to reside in any of the cities of Yarkund, it was customary for him to contract a marriage, to be dissolved upon his departure; how the Chinese, if a row took place in the streets, came down upon the mob with whips, but were, nevertheless, very just in their de-

cisions, and enforced the law of retribution;—and, finally, how the Chinese soldiers would not run, if beaten in action, but commenced killing each other and themselves afterwards."

The valiant Chinese, who kill each other and themselves afterwards, owe their double lives unquestionably to certain peculiarities of our author's style, of which we could quote many ludicrous examples if we were not afraid of being thought captious. But we shall rather hasten forward to meet Ahmed Shah, the Gylfo, or ruler of Iskardo, who, lying in wait for a party of robbers at one of the passes, received our traveller at his first entrance into the valley of the Indus. "I must have appeared an odd figure to him," says the latter, "being dressed in a broad-brimmed white cotton hat, and a white duck shooting jacket." The mountain chief gave him, nevertheless, a cordial welcome, remarking at the same time that he had long wished to see a European; and that desire being satisfied, he was curious only to see a negro. The robbers being all killed or taken, Ahmed Shah directed his steps homeward, and in a short time, from the snowy ridge, a scene opened which our author thus describes :—

"Through a long sloping vista formed of barren peaks, of savage shapes and various colours, in which the milky whiteness of the gypsum rock was contrasted with the deeply red tint of those that contained iron—I, the first European who had ever beheld them, (so I believe), gazed downwards from a height of six or seven thousand feet, upon the sandy plains and green orchards of the valley of the Indus at Iskardo, with a sensation of mingled pride and pleasure, of which no one but a traveller can form a just conception."

The capital or stronghold of this little state is itself the most remarkable object in the valley, and makes a good figure in the pages of our author, whose pencil is a most efficient auxiliary to his pen. His account of the place itself, and of his reception in it, thus proceeds :—

"We did not reach the rock until the afternoon of the next day, and upon my arrival I found that a good house at its foot, in which some of the Rajah's family usually resided, had been emptied for my reception. I followed the Rajah up the stairs, or rather steps, to the upper room, where one of his attendants immediately presented me with a plate of small, thin, fancifully stamped pieces of gold, made from the gold-dust collected on the banks of the Indus, and other rivers in the country, and another plateful of similar silver pieces, which I showered down from the balcony upon the crowd below. After that was exhausted, we threw down several bits of cloth for turbans, &c., and we all laughed heartily at the furious vociferations and scrambling that took place, even before they had descended. The Indus was visible from my window, and I then turned to enjoy the view of it for the first time. It approached through a sandy plain, from the eastern end of the valley, and here, nine miles from the entrance, it washed the end of the rock within musket-shot of me, in a noble stream of more than one hundred and fifty yards in width. The rock, or killah, as it is called, is about two miles in length, and the peak over the east end rises about eight hundred feet above the river. The whole of this superb natural fortress, situated in the middle of the valley of Iskardo, which is nineteen miles long and seven in width, rises with, in most places, mural sides, from a buttress of sand, loose stones, and broken rocks, excepting at the western end, where it slopes, but steeply, on to the plain; and on the east and north, it is washed by the deep and rapid torrent of the mighty Indus. The Gylfo's castle is built upon a small flat, about three hundred feet above the river. A wooden mosque and state prison form part of the building. The castle itself is of stone, with wooden framework, and is strongly fortified against musketry. The zig-zag by which it is approached, is also divided by gateways and wooden towers. Defences of the same kind are built on different parts of the rock. There is a look-out house on a peak a little above the castle, and another on the summit above that. In my hum-

ble judgment  
Gibraltar, a  
much reser  
killah to  
The po  
to resemble  
in their  
temper,  
tional id  
the ruler  
Mohamm  
the comp  
blish a b  
neighbour  
generally  
minute a  
able desir  
refinemen  
tions, ou  
of Chau  
Hippod  
hockey  
attend t  
should b  
to imita  
taineers,  
as "to  
the same  
humour  
is somet  
one or m  
North  
a mount  
enormou  
"occup  
can reac  
extremi  
The wa  
about a  
a mile.  
with all  
which r  
which  
avalanc  
"I h  
nature s  
waters t  
and gre  
and Av  
beneath  
ready-f  
which i  
and v  
force is  
with it  
against  
ducing  
and if n  
seen flo  
Iskardo  
once se  
that th  
saying  
tempte  
it sends  
its upp  
At s  
whom  
can he  
for wa  
Have  
have,  
and of  
pushin  
most th  
throug  
some  
attem  
tions  
Th  
little  
Indus  
dislik



ble judgment it could be made as strong a place as Gibraltar, which, in general configuration, it would much resemble, were the east and west end of the hill to change places."

The people of Iskardo, in Little Tibet, appear to resemble those of Ladakh, or Middle Tibet, in their frank and friendly manners, cheerful temper, and in the possession of those conventional ideas of social rights which enforce on the ruler the necessity of moderation. Yet the Mohammedan religion, which they profess, and the comparative mildness of their climate, establish a broad distinction between them and their neighbours; of whose singular customs and generally happy lives Moorcroft has given so minute and pleasing a portraiture. With a laudable desire to introduce into his own country the refinements and useful inventions of other nations, our author proposes that the Tibetan game of Chaugan be played at Bayswater (on the Hippodrome). It is nothing more, he says, than hockey on horseback. If the nobility and gentry attend to this hint, and hockey on horseback should become the fashion, we recommend them to imitate the caution of the flat-faced mountaineers, who are in the habit of playing it, so as "to keep an eye to their personal safety at the same time: for although the greatest good humour appears to prevail, an accidental blow is sometimes received, to the great detriment of one or more of the features."

North of Iskardo lies the valley of the Basha, a mountain stream rushing into the Indus. The enormous glacier from which the Basha springs, "occupies the entire valley, as far as the eye can reach, and a place that looks more like the extremity of the world does not exist in nature." The wall of ice above the village of Arindo is about a hundred feet high, with a width of half a mile. It advances perceptibly, as is the case with all glaciers, its upper surface being strewn with rocks and soil, not destitute of vegetation, which have been probably deposited on it by avalanches. Our author says of it,—

"I have never seen any spectacle of the same nature so truly grand as the debouchure of the waters from beneath this glacier. The ice is clear and green as an emerald, the archway lofty, gloomy, and Avernus-like. The stream that emerges from beneath it is no incipient brook, but a large and ready-formed river, whose colour is that of the soil which it has collected in its course, whose violence and velocity betoken a very long descent, and whose force is best explained by saying that it rolls along with its enormous masses of ice, that are whirled against the rocks in its bed, with a concussion producing a sound resembling that of a distant cannon, and if not permanently intercepted by them, may be seen floating on the Indus, even below the valley of Iskardo. Ahmed Shah informed me, that he had once sent some people to follow up the glacier, and that they had returned, after a few days' absence, saying that it appeared interminable. I should be tempted to infer, from the quantity of water which it sends forth, that a lake or reservoir must exist at its upper extremity."

At Shighur our author met a Persian traveller, whom he is pleased to style a Russian spy. But can he tell what motives the Russian empire has for watching the movements of Little Tibet? Have not the Russians as good a right as we have, to study the art of making tea with salt and mutton fat, or to penetrate into the mysteries of hockey on horseback? English travellers, pushing themselves everywhere, and making the most of their national name, are too prone, through excessive political sensitiveness, to assume themselves the character of spies, while attempting to counteract the supposed machinations of others.

The desire of Mr. Vigne to visit Ghilgit, a little State in the northernmost angle of the Indus, was repulsed by its ruler, whose prudent dislike of strangers seems to be vindicated by

subsequent events; for both Ladakh and Iskardo, which Europeans extolled as interesting countries, have been subsequently taken possession of by the Sikhs. We shall not criticize in detail our author's etymologies, and other proofs of erudition. Yet we must declare our conviction that the name of the Karakorum mountains is of Turkish origin, and means merely the "black rocks," and that it does not signify "a sugar plum," as Mr. Vigne maintains, "because those mountains are so difficult to cross." Neither can we be brought to believe that the name Guelph or Guelfo, which has descended from the ancient house of Este to the royal family of England, is originally derived from the Gylfo (or rather Rgylfo) of Little Tibet. We cannot consent to trace royalty and cannibalism to the same source. But while we dispute the value of our author's researches, we shall candidly allow him to recapitulate in his own words, the extent of his wanderings throughout the basin of the Indus:—

"I felt a peculiar satisfaction in knowing that I had probably seen more of that river than any other person ever did; I had drunk of many of its springs, and at the sources of many of its minor branches; and I alone had visited many of its mountains, lakes, and glaciers, which discharged their tributary streams in the shape of ready formed and furious torrents. I remembered with pleasure that I had crossed all the rivers of the Panjab higher up in their mountain channels; that I had forded the Shy-Yok at Nubra; that I was the first European who had been ferried across the Indus at Iskardo; that I had crossed the Chunar in Kishitawar, and the Ravi at Chumbla; that no living traveller but myself had drunk of the sacred element in the Gunga-Bul, the most holy lake that Kashmir can boast of; that, in the same regions I had ascended to the Kosmag, the birth-place of the far-famed Hydaspes; that the waters in contact with our boat, might have once sparkled in the Gomul, up which I had marched with the Lohannis to Ghuzni, or have descended to Attok in the river of Kabul, and have joined it after trickling from the melting snows of the Hindu-Kosh, to meander in a swollen flood along the verdant borders of its beautiful Kohistan."

Not much more than 300 miles now remain untraced of the whole course of the Indus, and we cannot believe that the perseverance of British officers and travellers will suffer so noble a survey to lie long incomplete. That being finished, they may then cross the mountains to the sources of the Oxus, and the frontiers of Chinese Turkistan. The mysterious region on the north of Tibet being once reached, the great problems of Asiatic geography will be solved, and there will remain no place for fable.

Respecting the war in Afghanistan, which our author discusses at some length in his prefatory observations, we shall maintain silence. That important question has been recently argued in an ample and, we conceive, satisfactory manner, in the senate. The appended chapter on the vegetation of Afghanistan and Kashmir, from the pen of Dr. Royle, cannot however be so lightly passed over; it is a valuable as well as agreeable addition to our author's narrative.

*Modern French Literature.* By Mons. Raymond de Véricour. Edinburgh, Chambers.

ONE of the consequences of the insular position of England, is the narrowness of its domestic notions, the suspicion or contempt with which the masses, "the great vulgar and the small," regard all things and all ideas that are (in their own jargon) *un-English*. This bigotry of patriotism operates unfavourably, not only on the national character, but on the national fortunes; and any attempt to enlarge the horizon of the public, and to familiarize it with even one branch of continental civilization, is worthy of support.

To present in an accessible form a tolerably full statement of the actual condition of French literature, an account of the French authors of the day, and of the works they have produced, is also to bring the people of this country acquainted with extensive fields of inquiry, of which they are at present profoundly ignorant. This ignorance, however, is not confined to the people,—it is a fact that must come within every man's observation, that public men, writers, and even the periodical press, greatly misunderstand the relative condition of the two countries, as respects the march of intellect; mistaking on one hand, stagnation for steadiness, and on the other, a restless and somewhat daring search after possible improvement, for demoralization and false taste. So little, indeed, is the actual state of opinion abroad understood, that writers of all conditions still babble, on occasions, about Voltaire and French impiety, as if no reaction had taken place—as if the current of French literature did not now set with much violence in favour not merely of religion, but of what our forefathers used to call superstition and priestcraft.

We are, then, as well disposed to go hand in hand with Messrs. Chambers, in their present attempt to diffuse amongst the humbler classes some acquaintance with our neighbours, and their literary doings. But it is with hesitation, and not without limitation, that we should praise the adoption of the specific work before us as the best possible instrument for carrying out their idea. The fulfilment of such a purpose is, we admit, a matter of much difficulty. The break between the English and the French mind is too abrupt and too wide to admit of a connecting bridge being easily constructed over the abyss; for while a Frenchman alone can be expected to be thoroughly possessed of all the knowledge of the subject necessary to its adequate illustration, an Englishman seems solely capable of perceiving with sufficient nicety the relations of specific points to the popular mind of England, of possessing the tact to determine what is familiar and what is strange and abstruse—to distinguish what is important from what is trifling; while a high and impartial philosophy, rare in both countries, is required to animate the teacher, and enable him to indicate the temporary and the accidental, as opposed to the fundamental and the permanent, in the prevailing ideas and systems; and to draw a clear and a firm line between the fashion of the moment and effective progress.

In these respects we should desire a hierophant more suited to his mission than Mons. Véricour; for while on some points he is more learned and elaborate than is necessary for his particular public, (taking too much for granted their capability of following him, or feeling with him,) in others he is not sufficiently dispassionate in his philosophy to become a safe guide to the mere uneducated reader.

Thus much having been said in discharge of our conscience, we can state that the work is in other respects a desirable addition to the Englishman's library; and that in its limited compass it contains many matters of fact which it is desirable to disseminate. If we do not always agree with the author in his particular judgments of men and systems, we admit that he is generally conversant with the subjects he discusses; and that, if his readers will only take his book as indicating matters for ulterior investigation, and preserve that independent frame of mind which should accompany all study, he may be perused to very good purpose.

The notions prevalent in England concerning French literature are at once false and defective; above all, there is little reference to the causes which have made it what it is, and, consequently, to what may be expected from it hereafter. Yet to

these causes must be referred whatever is absurd, anomalous, and extravagant in the popular literature, and much that is mischievous or inefficient in the politics, the religion, and the philosophy of the day. But beneath this surface of things, the current of progressive civilization sets strong. In the more lofty and solid departments of literature, works are daily appearing that indicate "a numerous body of profound thinkers" in the nation, not only as respects the authors who have produced them, but the public, who can appreciate and purchase them. The very extravagancies, which are justly attributed to the dramas and romances of the day, are indications of movement and vitality; and the search after strong emotion and convulsive sensations is a more curable malady than apathy and indifference. In spite, therefore, of appearances, the prospects of French literature are not only more hopeful than those of England under its present book-selling and material influences, but there is an actual and immediate "having"—an existing harvest of history, jurisprudence, morals, and what is called polite literature, indicating the presence of master minds, well entitled to take a forward place in the van of European civilization.

Turning, however, from these higher considerations as too vast for our limited scope, we prefer a recurrence to Mons. Véricour's statements respecting the French periodical press. Of its relation to criticism, he says—

"It has hitherto been found impracticable to maintain a French review on the plan of the best English reviews, for which we cannot well account. It may be that the impossibility arises from the public mind in France being too versatile and transient, and from parties and opinions undergoing such rapid and frequent changes and modifications. It is probable that as politics chiefly engross the attention of the nation, the critical notices on new works inserted in the newspapers, which are notoriously dictated by unworthy motives, sordid, party, or personal, satisfy the mass of readers. The *Revue Encyclopédique*, established by M. Julien de Paris, succeeded during several years, but eventually fell when its creator passed it to other hands. M. Guizot and the Duke de Broglie tried a fair experiment in 1829: they established the *Revue Française*, in which their political, critical, and philosophical doctrines were developed and applied with remarkable ability: but it did not last long; it sunk for want of support; and a recent attempt to revive it received so little encouragement, that it has again ceased to appear. The *Revue Trimestrielle* was also well conducted, but soon ceased. We are justified in affirming that the only reviews which possess the recommendation of long standing and general popularity, are the *Revue des Deux Mondes* and the *Revue de Paris*, and they are published more in the form of the English magazines than of the great reviews. And yet scarcely a year passes but painful efforts to establish new critical periodicals are witnessed, which invariably prove abortive; the puny productions perish for lack of sustenance after the most ephemeral of existences. One exception, however, must be noted in favour of the *Revue de Progrès*, which is edited with powerful energy by M. Louis Blanc; it has drawn the attention of the French public by the strong democratic principles it upholds, the bold tenets it has avowed in the face of the world, and the host of superior men who co-operate in its publication. The *Revue de Paris* is a weekly journal, containing critical notices, light tales, and worldly chit-chat, always elegant and sprightly in tone and matter, and especially calculated to beguile the leisure hours of the boudoir. The *Revue des Deux Mondes* frequently gives masterly pieces of criticism; such are the articles of De Carné, Saint-Beuve, Mignet, Marmier, Lerminier, Chasles, Charles Magnin, and others. \* \* \* With respect to reviews, we have specified the only two that have had any standing and permanency of merit. As to the monthly review called *Journal des Savants*, it would be a gross error to rank it among the ordinary periodicals of any country. It is, in fact, a review of the highest order, but at once private and

national; it only notices works of the first merit and utility; it is printed by the royal press, and the committee of authors who prepare its articles is composed of sixteen members belonging to the various sections of the Royal Institute. It is in the *Journal des Savants* that the admirable classical dissertations of Letronne and Burnouf, the valuable scientific investigations of Biot and Libri, the philosophical literary analyses of Cousin and Villemain, are to be found."

We doubt whether M. Véricour has here assigned the true causes of the failure of periodical literature in France. The most obvious is, in our estimation, the slow return to be expected from any great outlay of capital on a work of character sufficiently solid to meet an European or even a provincial demand. In Paris, everybody reads everything; and therefore nobody requires a patient or elaborate review; and for anything of slighter texture, the newspaper criticisms suffice. Another powerful obstacle to success in that department is the prevalent opinion of the corruption and dishonesty of Parisian criticism. M. Véricour takes credit for the custom of signing the articles with the author's name, as a guarantee against personalities; but it clearly does not prevent a very extensive system of levying black mail on all denominations of artists, as the price of protection. For our own parts, while we think the ballot very necessary to the freedom of critical voting, we are satisfied that publicity is a check unnecessary to the gentleman, and utterly useless as respects the literary scamp, who is generally as careless of his own character as of other people's. But a more fundamental cause of difference in matters of criticism is to be found in the different motives which influence the literature of the respective countries, to which the difference in their education largely contributes. In reference to education, M. Véricour observes incidentally:—

"The political writers of a French newspaper form a body distinct from the literary writers, and in each capacity they are generally very numerous. The greatest ambition of a French youth is to write something for a newspaper: a young Frenchman is as proud of having written a tolerable article for a journal, as a young Englishman of having said something in parliament—no matter what. This arises from the difference of education. In England, a boy is kept strictly to classical studies in public schools, especially in those attended by youths of the higher class, and is eventually sent to one of the universities, where he either wastes his time in dissipation, or exerts his utmost powers to obtain a fellowship, and his readings for the purpose are extremely exclusive, as is well known. In France, the system of education is totally different: every branch of it is comprehended in a single organisation, superintended by the Minister of Public Instruction. Nothing can be more ridiculous than to hear people talk of the University of Paris, or call themselves members of the University of Paris. Such an university does not exist; there is but one in the kingdom, and it is the *Université Royale de France*, which extends its ramifications through every part of the country. It consists of various colleges, whereof fifty-five are royal colleges (five in Paris), and about four hundred *colleges communaux*, of an inferior order, partly supported by different localities. \* \* \* The studies in those colleges continue until the age of seventeen or eighteen in general, but they are not confined to the classics; science and the modern languages are taught at the same time, and peculiar attention is paid to the French language itself, to diction and elocution. When a student, therefore, reaches his last two years of collegiate education, one of which is devoted to rhetoric and the other to metaphysics, he becomes a great adept in literary discussion; the high and solemn prizes which are every year awarded to the best compositions, excite his emulation; that literary enthusiasm, so characteristic of the nation, warms gradually, until his greatest ambition is to see himself in print. Moreover, a French youth is unique for his proneness, in general, to all literary and political discussions."

From this state of things it follows that literature is more closely connected with practical life than with us. With the exception of legal and medical works, English literature is for the most part an "idle trade," unconnected with a lofty and generous ambition. Whereas the Frenchman—at least the better order of Frenchman—writes to become distinguished as a man of the world. He can ill afford to lose time on mere technical criticism. He is aiming at professorships, seats in the Chambers, Institute, or governmental employment: and thus the work of reviewing is committed to subalterns in character or in attainment, or is the product merely of occasional inducements.

One of the most valuable chapters of M. Véricour's work, as respects the English reader, is that on the French historians. In it he has collected much information which hitherto has been very partially diffused in this country; and though we cannot always adopt his opinions, we must acknowledge that his criticism is scarcely less useful than his facts. On the whole (bating a touch or more of transcendentalism), we have read the work with pleasure, and recommend it, especially to such of our readers as are disposed to canvas the philosophy of the subject.

#### OUR LIBRARY TABLE.

*The Manœuvring Mother*, by the author of the 'History of a Flirt.' 3 vols.—We were the first to call attention to the excellent truth and nature of the 'History of a Flirt,' and looked, with more than usual expectation, for the appearance of another work from a hand which had been so fortunate in its pictures of life among our middle classes. If this new book do not increase the reputation of our authoress, it will sustain it. She is many degrees nearer to Miss Austen, than any of her contemporaries; she writes, too, with as much care as purpose; and though some may denounce her details as trivial, her characters as commonplace, and her inventions as uninformed by those poetical and philosophical inspirations which ought to quicken fictions of the highest order, she will keep her place, we are inclined to think, as she has won her way: that is, steadily, but unobtrusively. There is great skill in her conception of the *Manœuvring Mother*. Lady Wetherall intrigues for the brilliant establishment of her five daughters, not so much from selfish designs for her own aggrandisement in theirs, as from a mind perverted—which regards rank, wealth, and show, as the absolute necessities of existence. Hence, with all her folly—with all her steady disregard for the feelings of those she sacrifices, we are compelled half to sympathise with her disappointment, rather than remorse, when Clara dies of a broken heart, and when Julia flies from a loveless home. On her machinations depend the tragedy and the sorrow of the story: but the tale has a brighter side also. Lady Wetherall has three recalcitrant daughters, who, to quote the Irishwoman's definition, covet neither "grandeur nor goodness, but only pace and dacency," and marry much to her disgust—but to the entire contentment of their milder and more sensible father. Anna Maria, the eldest, wins a jewel of an English squire, whose mother, free-spoken Mistress Pynsent, with her coarser sister, Sally Handcock, are among the best characters of the book. If the men of Science were not sitting, we should like to treat the reader to a glimpse of the rough household at Hatton. Then there is silly, pretty Isabel, with her preceptor husband, Mr. Boscawen,—and her tiresome sister in law,—who contrives to escape from his instructions, and Tabitha's oppressive carefulness, into a perfect freedom of happiness, which, alas! we fear, belongs to the novel, rather than to the probable course of events. Lastly, comes the heroine of the tale, Christabelle, the pupil of her father, the Cinderella of her mother, only taken up by the latter as a last manœuvring stock, when all her elder sisters are disposed of. Hard are the trials she must undergo before she is allowed to be moderately rich, and immoderately happy. We could mention almost every other personage of the tale with a note of commendation: but enough is said to make our readers seek for



the work: and, once found, its merits will presently ensure for it as healthy a popularity as belongs to its predecessor.

*A History of the Woollen and Worsted Manufactures, and the Natural and Commercial History of Sheep*, by J. Bischoff, Esq., 2 vols.—That which Mr. Baines did for the History of Cotton, Mr. Bischoff has achieved for the History of Wool. The work is put forth as an avowed compilation; but it is one which evinces ability and extensive knowledge in the compiler, who appears to have been specially engaged in watching the vicissitudes of the trade, and in fortifying, by facts and arguments, the efforts of the merchants and manufacturers, who ultimately obtained the laws which now govern the trade. The history of wool is commenced at the rather remote period when "Abel was a keeper of sheep," and brought down to the present day in ample detail, relating, not only to the commercial bearings of the subject, but to the nature, varieties, and habits of the animal producing the staple, together with a view of the various modes and means adopted or suggested for the improvement and extension of the breeds of sheep, and the quantity and quality of wool. The advance in the manufacture, and of every movement towards the emancipation of the trade from its legislative trammels, is recorded. There is reason to believe that the British woollen trade has been materially crippled by the growth of the cotton trade, and that had there never been any restriction on the importation of foreign wool, the manufacture would have been infinitely greater than it is; the desire for and use of cotton goods would have been proportionately less, and that leviathan branch of industry would never have obtained that magnitude which, probably, jeopardizes our exporting power, by limiting it greatly to one sort of commodity. The history of the last few years of our legislation in respect to wool presents many salient and interesting features, all clearly illustrating the evil tendency of restrictive or misallied protecting duties. By a calculation derived from returns made to the House of Lords in 1828, it appears that we then exported a greater weight of wool in the manufactured, than we imported in the raw state. Mr. Bischoff at that time estimated the weight of wool contained in the various woollen manufactures exported at 47,037,000 lb., and the weight of foreign wool imported at 28,111,000 lb., giving a large excess of wool exported. The difference arises, of course, from the mixture of British with foreign wool, which is of a superior quality to that produced at home. Thus, the English grower obtains a market abroad for his wool, which, in its pure state, events have proved he is unable to do, though its free exportation has been allowed by the legislature. As a hand-book on the subject of wool, Mr. Bischoff's work will be found valuable by all persons commercially interested in the subject; but it has been spun out to a most wearisome extent, and whole speeches, pamphlets, and letters, are quoted at length, which ought to have been abridged, or merely referred to.

*Bees: their Natural History and General Management*, &c., by Robert Huish, F.L.S. &c.—*My Bee-Book*, by W. C. Cotton, M.A. &c.; with numerous wood-cuts.—Without subscribing to the truth of Cowper's account of the several origins of Town and Country, we never take up books like the above, without feeling the healthier and happier for the meeting. The repose of the forest-walk is on them, and the fragrant summer meadow breathes through their pages, and we forget the hot pavement, the glaring lights, the loud voices of London-with-the-many-sins, in which Charles Lamb delighted. Thus, though no bee-masters, we have read the works of Messrs. Huish and Cotton with great pleasure. The former is the more exact. Mr. Huish, indeed, claims cap, gown, and chair, as *Regius Professor of Apian Science*, demolishes in every page one or other of "the crude and fallacious statements of Huber," and weightily insists on the importance of societies "of which we were the founder," and on the authority of experiments conducted under such solemn auspices. In less sportive English, his book contains much solid information somewhat dogmatically delivered. Not so Mr. Cotton's. It is quaintly fanciful, every page of it: thick studded with such black-letter interpolations as Father Prout and the Doctor delight in, and elegantly garnished with a plentiful assortment of wood-cuts, carefully executed by

"Josiah Wood Whimper, No. 20, Canterbury Place, Lambeth," whom our author thanks for his pains with elaborate courtesy. Seldom do we shake hands with such an enthusiast as Mr. Cotton. His work is preluded very pertinently by an anthology of poetical passages appertaining to his subject. He has a lover's affection for the queen, the drone, and the working bee, whether they sing through their flowery task on Hymettus' side, or in his own rooms at Christ Church, Oxon; he believeth the same to have high duties and destinies. Whereas some philanthropists would allot land to the pauper, Mr. Cotton would present him with a stock of bees and a hive, and thus, saith he, not only fill the poor man's purse, but amend or confirm the poor man's morals; since bee-keeping implies personal cleanliness, patient industry, and judicious tillage of the ground. Strong in such a faith, Mr. Cotton lovingly lectures the cottagers in homilies which their landlords may read with profit: while for the dwellers in parsonages and halls, he culls pleasantly choice antiquarian morsels—and, as has been already noted, quotations from the best authors, ancient and modern. In its present form, his book may be too luxurious and expensive for the peasant's library; but it ought to figure on the shelf of many a squire and scholar.

*Leila in England: a Continuation of Leila, or the Island*, by Ann Fraser Tytler.—Though "Leila in England" may neither rise to the heights of juvenile fancy, or dive (Marcel-wise) to the depths of juvenile capacity, it is a pretty and harmless child's book; with an attempt at tracing of character, which even the youngest readers will enjoy, though unable to explain the source of their pleasure. To one incident, however, we object, as too romantically sentimental: this is, the recovery of the dumb girl—a passage permissible only to the novelists of Rosa Matilda's school, and by no means to be countenanced in a writer generally so cheerfully sensible as Miss Tytler.

*The Climate of the United States, and its Endemic Influences*, by Samuel Forry, M.D.—A volume of highly interesting facts, condensed into the smallest compass. To do it ordinary justice would require a much more minute analysis than our readers would be inclined to follow. We can, therefore, only notice the publication, for the benefit of those to whom medical statistics is a subject of peculiar interest. The work is creditable to the medical science of the U.S., from which body, in more senses than one, it emanates.

*The Young Wife's and Mother's Book*, by P. H. Chavasse.—The title of this book sufficiently explains its nature. The subject merits a more philosophical treatment than it has hitherto met with. A little learning may, it is true, be a dangerous thing, but it is better than none. A sweeping condemnation, therefore, of the attempt itself to instruct young wives and mothers by a royal road, would be an exaggeration. At the same time, we have some doubts of the safety to the ignorant, of putting their trust in what they can pick out of such books. The proper preparation of females for the station they are destined to hold as wives and mothers, is the one thing needful; and with it mere guide books to medical practices in given contingencies would not be needed, while better works would be in demand. We must, however, take things as they are: and the present volume may answer its purpose as well as any of its many competitors. It is generally exempt from prejudice, and the writer's views are, on the whole, liberal.

*Etymological and Explanatory Dictionary of the Terms and Language of Geology*, by George Roberts.—This little work is, as the author designed it, useful, and in general full and correct enough to deserve the confidence of the reader. A few cases require emendation, such as the etymology of Eneerites, and the other compounds of Crinites, which is derived from *κρίνω*—a lily; but there is much merit in the book.

*The Nomenclator*, by Edward Scudamore, M.D.—This work is proposed as a "Technological Dictionary, containing all the principal terms in use in the Arts and Sciences." The object is unattainable in so small a volume; but the author has packed into it a considerable collection of words requiring explanation, and accentuation. The selection of the terms in works of this nature should be very careful, and based on clear principles. In Natural History, we should not have Arca admitted, if Falco and Felis are rejected.

*Dictionary of Practical Medicine*, by James Copeland, M.D., Part 7.—*Cyclopedia of Anatomy and Physiology*, by Robert B. Todd, M.D., Parts XXI., XXII., XXIII.—The above have been lying for some time on our table; but we have only to report progress. The works are too well known to require a critical notice, even did they come within the sphere which we have assigned to our medical library.

*The Cyclopedia of Popular Medicine*, by Keith Imray, M.D.—We agree with Dr. Imray in his assertion, that the public should possess some knowledge of the nature and treatment of disease; but we cannot accompany him in his conclusion, which is a volume of 850 pages, for supplying the desideratum. The book is by far too big to fling even in the face of the medical student; and, admitting the matter to be of the best quality, it is too large a dose for a lay patient. But, like every other book of popular medicine with which we are acquainted, it is defective in the necessary method, without which such works can only beget ignorant presumption in the heads of conceited and weak readers. As to the execution of the work (for we speak only of the design), we leave that to the consideration of the professional reviewers.

*A Practical Treatise on Auscultation*, by M. Barthe, M.D., and H. Roger, M.D., translated with notes by P. Newbigging, M.D.—A work strictly professional. Those medical students who do not understand the French language, will do well to possess themselves of this translation.

*Serial Publications*.—The time is yet young in our memories, when cheap literature was exempted from the jurisdiction of the critical tribunals; or, to speak somewhat nearer to the fact,—when our lordly periodicals would have disdained to acknowledge the existence of such plebeian publications, except under the indiscriminating appellation of "twopenny trash." There was, indeed, at that time no great reason for adopting a different course. The one engrossing subject of cheap literature was, then, mere high pressure politics, of no very polished or soothing character; and the only critic, within whose province it occasionally fell was the Attorney General. The change, which has since come over the spirit of the age in this particular, is among the most striking of modern revolutions. The "schoolmaster abroad" has come home to the business and bosoms of publishers, in the shape of a new demand, outstripping the remunerative faculties of the old aristocratic purchasers; talents are brought to bear upon the rising market, on the exercise of which more depends than it comes within the compass of an article to declare. Among the contributors to this class of publication have been some of our most successful authors.—Mr. Dickens, Mr. Hood, Mrs. Trollope, Capt. Marryat, Mr. Ainsworth, Mr. Miller, Mr. Lever, Mr. Lover, and others have all sought remuneration from a shilling public. We have now on our table half-a-dozen numbers of *Handy Andy*, a work in course of publication by Mr. Lover—half-a-dozen of a work called *The Commissioner, or De Lunatico Inquirendo—of Our Mess*, edited by Harry Lorrequer—*Combe Abbey, an Historical Tale—of Godfrey Malvern* by Mr. Miller—and numberless numbers of works of like character. Here then is a newly discovered region where the interests of humanity are becoming so deeply staked, that instead of criticism passing it by contemptuously, it is especially called on to exercise a wholesome vigilance. But the duty is more obvious than the time and manner of executing it. Again, by what standard is this new literature to be measured? It is necessary to bear constantly in mind, that it is not imposed on the people, like works for their professed instruction; but is the result of their own spontaneous demand, flowing directly from an effort of the trade, to meet the wants of its customers. The business of this portion of the press is not, therefore, so much to be in advance of the age as to go along with it, and whether it be considered in the more serious departments of instruction, or in the lighter function of amusing its readers, the taste of the public must be the rule for its government. To measure all such productions by the standard of that refined literature which has for its object the satisfaction and gratification of educated taste, would be at once absurd and unjust; and when it appears that the moral and intellectual objects at which the writers aim, is not of that elevated kind which theory might desire to see in "the best pos-

able instructor," we may still rejoice that there is no pandering to passion, or prejudice: and this is an honourable and marking feature in most of them. This testimony we bear willingly to their general character, but as to the literary pretension of each, it is not our fashion to jump to conclusions or to pronounce judgment before we are able to comprehend the whole aim and object of the work. We, therefore, reserve ourselves, as even in the case of Mr. Dickens's most popular issues, until these several publications are so far complete that an opinion may be hazarded which after "no repentance draws."

Art alone offers homage to the people, and they have their illustrated works—works of art which appeal to a half-crown public. These are less difficult to deal with, for their strength generally rests on their illustrations. Under this head may be classed Winkles' Cathedrals—Winkles' Views of the Danube—Hall's Ireland—England in the Nineteenth Century—The Castles and Abbeys of England—Knight's London—Le Keux's Cambridge—and what is appropriately called *The Abbotsford* edition of the Waverley Novels, a very beautiful and interesting work. Of many of these we have spoken at length, and on others we shall report hereafter. It will be sufficient here to observe, that most of them are got up with care, and at great cost, considering the extent of sale necessary to remunerate the publishers.

**New Editions.** Here again the appeal is to the public. It is now all "cheap editions"—"people's editions"—shilling, sixpenny, three-penny, two-penny editions. Think of Byron in sixpenny numbers—the Giaour, the Bride of Abydos, and other tales, sixpence each; Manfred, Marino Faliero, and the tragedies, sixpence! Scott's Novels in twopenny numbers! What a change since the aristocratic days of hot pressed quartos! But we must not indulge in comment.

**List of New Books.**—Practical Reflections on the Nature and Treatment of Disease by S. W. Tilke, new edit. 8vo. 10s. 6d.—A Few Days' Stroll about Paris, 18mo. 1s. 6d. cl. gilt.—Eberhard's Dictionary, improved by Stephen Jones, new edit. square 12mo. 3s. 6d. bd.—An Abridgement of Dr. Goldsmith's History of England, new edit. 12mo. 3s. 6d. bd.—Page's Decorator and Mechanic's Assistant, oblong, 5s. 6d. cl.—The Teacher's Farewell, with an Address, by Henry Althaus, 18mo. 2s. cl.—Bright's (Rev. J. S.) History, Doctrines, &c. of the Congregational Churches, 8vo. 2s. cl.—Grant's Pictures of Popular People, 24 cuts, super-royal 8vo. 6s. 6d. cl.—The London Saturday Journal, Vol. III, 4to. 6s. 6d. cl.—The Biographical Dictionary of the Society for the Diffusion of Knowledge, Part I., 8vo. 12s. cl.—Butler's Etymological Spelling Book, new edit. 1s. 6d. bd.—A Shilling's Worth of Nonsense, by the Editors of 'Punch,' 12mo. 2s. 6d. bds.—Bizarre Fables, by Arthur Wallbridge, 12mo. 4s. 6d. bds.—Punch, or the London Charivari, Vol. II, 4to. 8s.—Consacrated Thoughts, by the Rev. W. Harrison, A.M., 8s. 2s. 6d. cl.—Peregrine Bunce, or Settled at Last, by Theodore Hook, Esq., 3 vols. post 8vo. 31s. 6d. bds.—Bentley's Miscellany, Vol. XI, demy 8vo. 16s. cl.—Memoirs of the Rt. Hon. Sir Robert Peel, Bart., 2 vols. p. 8vo. 21s. cl.—The Christian Pilgrim, a Poem of Palestine, by Edmund Peel Bonchurch, 12mo. 7s. 6d. cl.—A Treatise on the Elementary Properties of the Ellipse, by the Duke of Somerset, demy 8vo. 2s. 6d. cl.—Knight's (C.) Library Edition of Shakspeare, Vol. IV., 8vo. 10s. cl.—The Pictorial History of England, George III., Vol. II., imperial 8vo. 20s. cl.—Esther and her People, by the Rev. John Hughes, 18mo. 2s. 6d. cl.—Griffin's (Gerald) Works, Vol. VI., 'Duke of Monmouth,' 12mo. 6s. cl.—Page's (John) Income Tax Act, 12mo. 4s. bds.

## FINE ARTS

### EXHIBITION OF ANCIENT MASTERS.

WILKIE'S WORKS.  
[Concluding Notice.]

IN this paper we propose to conclude our concluding notice. A volume might, and should be, written on the works of Wilkie, who was emphatically a Painter for the People: but to such a volume we can furnish no more than a possible outline, an imperfect table of contents—our previous suggestions, and these final ones, both which would form at best a mere nucleus within the orb of illustrative criticism required by a theme so national. Little has been said upon it as yet beyond what "Wonder with a foolish face of praise" may have uttered; the inner principles producing the outward effects, the elements constituting Wilkie's artistic power, are known to very few persons, though imagined obvious to every one. Many admirers think they explain all in the rapturous ejaculation that Nature alone was his Art, a popular notion about as correct as its opposite, that Art alone was his Nature. The truth per-

haps is, that the most natural among his creations are likewise the most artistic, and that after Reynolds, Wilkie was the most of an artist among our six great Modern Painters. Hogarth, Wilson, Gainsborough, wrought much, it may be said, at random, following their own fine wild wills, without observing any philosophical law of procedure—on which, nevertheless, perfect art, as art, must found itself: Lawrence cultivated in his practice but the one pervading principle, delicacy of treatment, which he carried to its utmost. Both Reynolds and Wilkie sought out all the deepest, subtlest arcana of their profession, and adopted all those compatible with their subjects. This was the right catholic spirit, if their aim was to become supereminent painters; nay, even if it was to become supereminent poets on canvas. How many of Hogarth's painted poems want their due vigour from his defective masterdom over the pencil. How inferior oftentimes compared with his engravings, because of his rough dexterity at the burin. When Wilkie laid aside the sound, recognized principles of art, he became, paradox as it may seem, not more natural, but more artificial; for example, in his later productions, which are as mannered and affected as his earlier are spontaneous and simple. He appears to have had even less than Reynolds a substantive, self-dependent genius, except that also be a species of it—a genius able to stand up thrushed amidst its multitudinous acquisitions from without, and maintain its dominant character through all its imitative efforts, which would destroy the identity of a mind not so original. Had Milton no substantive, self-dependent genius, because he made use of classic and Italian models towards its improvement? Wilkie may have resembled his countryman Walter Scott, who borrowed assistance upon every hand, rather than his countryman Burns, who borrowed little anywhere; yet the buttresses, far from overlaying the tower, only rendered it firmer on its own foundations. At the same time we do not rank Wilkie for this reason above Hogarth more than Scott above Burns, but in truth about equally beneath him.

With respect to Wilkie's fifth style, of which our last notice cited the chief examples, 'Blindman's Buff,' and 'The Village Festival,' few other remarks need be added. His presentation picture to the Royal Academy, called 'Digging for Rats,' dated 1841, evinces those qualities we set down as distinctive of this period—curvilinear outline, skilful agroupment, appropriateness without peculiar individualization of character; its touch smooth, its colour mellow and unctuous—but its condition bespeaks the care of a Public Body for public property under their guardianship, being "as dull, as dead in look, as woe-begone," as if it had come from the vaults of St. Martin's Church, not of their Establishment hard by. We have mentioned 'Ransacking the Wardrobe,' 1810. By the bye, these dates rather mark the mere execution of the pictures than their conception, which latter determines their epoch and style. Thus 'Blindman's Buff,' though painted in 1812, was premeditated at least a year before, as is plain from the admirable Sketch No. 8, signed 1811: thus likewise the 'Village Festival,' exhibited in 1812, having been sketched in 1809. The date on No. 21, proves that this style followed its predecessor earlier than would seem, and so illustrates the restless activity and ambitious explorativeness of our artist's mind. No. 32, 'The Bagpiper,' dated 1811, is individualized with a spirit and knowledge of human nature creditable even to the fourth style: he bears his little round felt hat as proud and high as the God of Music his laurel, yea, or his radiant crown; and it is plain by his attitude he thinks the skirl of his chanter should awaken all Scotland from death's sleep itself, like a particular last trumpet blown on Ben Nevis—verily, there is deep character, too, in the bold cock-grouse glance of his eye and the hardness of his heather-coloured complexion. Yet though painted with great brilliance and a tasteful care, we prefer relatively to its mechanism, 'John Norman, Blacksmith of the Village of Culps,' No. 37, a less artificial, but more artistic, production: date 1813. Here both touch and tint betoken character as well as the traits; if his features look hammered out and filed, the tints seem welded after a coarse, strong fashion; the touches are dexterous smutches, the general tone is a cool iron-grey,—everything denotes the toil-worn Son of the Anvil, who half washes his brow at supper-time

in his ferruginous trough-water: he is Blacksmith to the very blarney of his eyelid, which smoke and coal-dust have tormented. This work, however, comes under Wilkie's seventh or Mixed Manner.

The sixth style demands particular consideration. It returns *per saltum* over the fifth to the fourth, subordinating agroupment and sedulously prosecuting development of character, eschewing small proportions,—indeed, enlarging its figures to a yet unusual size,—and relinquishing the apple-blossom complexions, the nosegay assemblages of tints, for quieter and more uniform colours. The rectilinear outline is also readopted in great part, the curvilinear only not abandoned. But our artist appears to have had as his chief object all through this sixth style, the principle of illumination, which may be accounted its demarcator. He brings "the sun into the room"; he saturates with sunlight every object which has any affinity for it. The reigning tone of his pictures is a sweet, soft, luminous yellow; the local hues are most often gay and brightsome, even when the scenes depicted are mournful. No. 44, 'Distraint for Rent,' will exemplify these several positions, and we think so far verify them. 'Rent-day' itself does not dramatize the subject better, nor distinguish its *dramatis personæ* one from another by more characteristic and appropriate qualities. There is that perfect pattern of scolding queans, the toothless dame, who has got a freer vent for her shrill eloquence, her hard-grey eye spitting forth and sparkling with fire like a stone-coal that burns unconsumed: shrewish to her own good man, crabbed and cross to her own children, what must she be to a Bailiff? There is the Dog under its unfortunate master's chair, a suppressed growl from the tip of its nose to the bottom of its chest,—second only to the sceptical Dog in the 'Blind Fiddler,' perplex beyond measure at the family's endurance of such a disreputable stranger. Though 'Distraint for Rent' be no cheerful subject, a sheet of latent sunlight gleams throughout the whole composition: it spreads evenly, with not one strong contrast from end to end, with a quietude of *chiaroscuro* like that produced by the subtle, undulant modelling in a Greek marble. It resembles the uniform glow of a *Cuyp* landscape transferred to an interior. But *De Hooghe's* condensing power, which makes his pictures look like corners of a hot-house, perhaps kindled our painter's ambition. Nos. 25 and 62, 'The Errand Boy' and 'The China-menders,' have quite *De Hooghe's* air of *outside* interiors, (for even his exteriors seem built up or shut in—*closer*, let us call them,) but still imitate them with an originality, tempering their fervid lustre by the impalpable mistiness that gives a cooler tone to our atmosphere. These pictures were among the last of this style; both are referred to 1818, three years later than the first-cited work. No. 43, 'The Breakfast,' 1817, presents as cheerful a parlour as those two self-pampering domestic Epicures, the old lady and gentleman, could desire to suit themselves in, and comfort their frigid constitutions with the warm South, besides hot tea and toast and a heaped fire. The submissive *Reader-out* at table, who seems to be on his P's and Q's, and the more independent Maid-servant, who could be smart if not saucy, for all her sweetness of complexion, are admirable contrasts to each other, and to their superiors. Wilkie was a shrewd hand at old women of both sexes; the Mistress's character here is written at full in the lines of her countenance; she is evidently a martinet in tea-making, and most punctilious about all matters which concern her personal welfare. We have no time to enlarge further on this work, nor to discuss, as we would wish, the merits of its companions. No. 50, 'The Pedlar,' has a primitive look, yet dates itself 1815\*: its light and shade relieve, yet do not force, each other; the characters are likewise natural, and vivid without being over-expressive,—save one perhaps, the girl who holds up a muslin pattern less to examine it herself, than to make us remark she examines it. This *playing to the spectator* is always a fault, and too frequent with Wilkie. We shall have more of it anon. No. 47, 'Duncan Gray,' 1814, and 'The Letter of Introduction,' 1813, come under

\* Several dates in the Catalogue are erroneous, even when they appear written plainly on the pictures themselves! Such oversights render almost disserviceable a compilation that will be appealed to as an authority, published under the auspices of the British Institution.



the sixth style, but do not close its period. We have a small folio written about each on our cerebral membrane, yet want time even to copy it on paper for printing, as we purposed. In brief, we prefer 'Duncan,' tried by its mental worth, and the 'Letter' by its mechanical (to make a popular distinction), although within the limit of so confined a subject this last work compresses much excellent meaning. Caution never looked from beneath more inquisitorial brows, or endeavoured with more circumspect side-glances to spell and put together, than he does who compares the letter and the letter-bearer: his very attitude gives that moiety of a cold shoulder which your man-of-the-world bestows upon all humble applicants. Again we must signalize the Dog, who snuffs in such a suspicious way, that he almost seems to sneer at the stranger. This is extracting the quiescence itself from Nature. But we must on. There are some other pictures to be classed under the sixth style,—e.g. 'Guess my Name,' 1821; No. 19, 'The Rabbit on the Wall,' 1816; No. 27, 'The Newsongers,' 1821, &c. But these and their above-mentioned class-fellows present, nevertheless, distinct phases of the painter's mind; these exhibit the principle of artificial illumination, those of natural illumination, reflected by Correggio and by De Hooche severally. 'Guess my Name' and the 'Rabbit' imitate the *Notte* principle, which spreads light from a centre over a spherical circumference of objects growing dimmer as more distant; the 'Newsongers' proceeds on this principle reversed, and still Correggicque, which spreads shadow from a centre, and lets it lose itself amidst the surrounding light with gradual diminution. It is no valid objection that Wilkie had never seen the *Notte*; he saw copies or prints of it, just as he saw some work of *Ostade* at second-hand, which was quite enough to inspire and instruct his sympathetic taste. *Thorvaldsen* never had seen the *Elgin* frieze itself when he sculptured his 'Triumph of Alexander.'

No. 14, 'The Chelsea Pensioners,' 1822. This is esteemed Wilkie's greatest work by many critics, especially artists. And it has many claims to that high distinction. Its general effect is powerful, its detail most varied, teeming over with mental riches. Certain of the characters are unsurpassed for graphic truth of delineation, and for exquisite painting: the groups are fine pictures by themselves; the subject would be intelligible to an idiot, as far as that it was news of a victory, and to every one besides but an absolute ignoramus, that it was *Dispatches* from Waterloo; so well seized, and selected, and set forth, are the circumstances. We admire its numberless shining points, which would trouble us little less to catalogue than the fixed stars, for the more intimately they are observed the more infinite do they seem. Yet, and after all that can be said or sung in its praise, we doubt if it be Wilkie's *chef-d'œuvre*. It has tremendous faults to balance its transcendent merits. We do not know one of Wilkie's good pictures which congregates, and exaggerates, so many of his defects, and metamorphoses so many of his beauties into blemishes. It strikes us as the most artificial among these productions; even its most natural objects have an air of the *preposse* about them—it is *composed* rather than inspired. Nevertheless, its composition, though skilful pictorially, we think poetically erroneous; it seems painted piecemeal, and, by dispersing the masses to people corners, diminishes the unity of action: such *dispatches* read, for the first time (which the reader's face certifies with marvellous expressiveness), would make but one group of all listeners, while here much fewer collect round the centre of attraction than stand away from it—some to hear a haggard preference, some to eat oysters in the dog-days! Shakespeare would not have done this, had Shakespeare been the painter. It never did, nor could have, happened, unless Chelsea Hospital were a Porch of military stoics. Again, we think illumination is pushed somewhat too far—into glare, or at least un-mellow brilliance. Wilkie was a feeble draughtsman, yet generally exhibits the next power to it—adroitness in concealing his defect: here it becomes almost ostentatious,—several figures are not only ill-drawn, but solicit us to observe that they are so,—for example, the long-armed Blackamoor, the spindle-shanked Life Guard, the distorted Dragoon and his long-limbed Lady, &c. We should also wish that the

picture had less the air of a *tableau vivant*, the characters less importunity of attitude and expression, hungering for the spectator's notice and applause: this is what we called "playing to the public."—Look at 'Blindman's Buff,' how natural and genuine the enjoyment, how the personages all play to themselves, for the game's sake, and not for your gratification,—they are unconscious of your presence! We can neither find nor fancy a fault in the old Pensioner, venerable still despite his dotardism and his muddled condition: he is perhaps the most graphic among Wilkie's figures, perhaps the clearest portrait of character: if we rank him beneath the aged Peasant of 'Rent Day,' we do so because he seems less a creation, a mere individual, while the other epitomizes a whole species; this is Old Jack Such-a-one, that is toil-worn Rural Senility. If, notwithstanding its superior mechanism, or at least effectiveness, we rank the present picture itself beneath 'Rent Day,' it is because, though both subjects are common occurrences, the latter would occur less to a painter's mind, and evinces therefore a higher invention, besides having a moral dignity throughout all its homeliness of subject, which the 'Chelsea Pensioners' cannot arrogate. To conclude, we are much mistaken or 'Rent Day' will prove far the sounder painting, and will remain a monument when its rival has become a ruin. The lime-like substance which gives the latter its present brilliancy will burn it up. We regret to add, that a similar fate threatens many another besides this noble picture by our explorative, or not altogether conscientious, artist. One half his works have the *dry-rot* upon them now, and some will drop into dusty nothing before their purchasers. To obtain effect, or facility, he made use of a *white* in his later works that poisoned them—that was powdered arsenic to their constitution! No. 40\*, 'Not at Home,' painted but nine years, is already a *pot-pourri*—a festering compost of rich, rank colours. Had we no other reason, this were enough to make us lament that Wilkie ever relinquished his earlier, careful, severe manner.

No. 20, 'The Penny Wedding,' 1820. A Dutch *Kermesse* translated into Scottish characters; Teniers's spirit walks among them again, after having been laid in the river of Lethe for so long an interval. We do not make the remark disparagingly, but as a psychological fact, a point of artistic and of historic interest, like Raphael's recurrence unawares to Perugino's design at a late period. The work before us agrees with Wilkie's sixth style in most particulars, except its diminutive figures. It has, however, some singularities. The illumination is bright, but broken up, and its tone a disagreeable tawny. Decomposition has set in here also—the tints are corrupted, decayed, or fled altogether—leaving several faces disfigured like mummies, lips melted into one, and cheeks yellow or bloomless. Out upon the quick-lime that did this! Yet many admirable portions remain. The auld wives, as usual, bear off the bell. One, occupied in that kind of stationary dancing practised by common people, who lift their legs as a steam-engine its pump-rods parallel to each other, always from the same spots, is laughter for a twelvemonth:—her visage so full of self-complaisance, her clumsiness so buoyant with good humour! The attitudinarian next her would cure a cynic of the spleen, to see his capricious, far more risible by their efforts at grace than a theatrical clown could render his by forced distortions. This whole group strikes us as perfect in composition. The Girl putting on her shoe is an elegant version of a very rustic action.

Wilkie's fourth, fifth, and sixth styles, contain his best pictures. 'Reading the Will,' exhibited in 1820, is amongst them; as a composition it belongs to a much earlier period, that of 'Rent Day,' but if we remember right, does not regain much primitive excellence of workmanship. We saw it at Munich some five years since.

Our task, and the reader's, is almost done. We shall pass over, without numbering, Wilkie's Spanish or Italian style, of which 'The Maid of Saragossa,' 1828, the three 'Guerilla' scenes, 1828 and 1830, 'Columbus,' 1835, are samples; and his Oriental style, exemplified by 'The Hookabardar,' 1841, and the 'Turkish Letter-Writer,' 1840; all, to our judgment, feebly imagined, ill drawn, and worse painted, save here and there a rich blotch of colour or a tasteful "bit of the naked." We shall likewise not stop

to discuss his intermediate style, preferable, though still deplorable, which we would entitle his *Mannered* style, from its predominant affectation, bizarre originality both of idea and execution, false sentiment, and fantastic costume. No. 12, 'The Fortune-teller,' 1837, is a favourable specimen. It outrages both the truth of Nature and of History, representing Josephine, the simple-hearted Creolian Empress that was to be, as a pale-faced English fashionable, yet does not want elegance or expression or delicate colouring after their kind. No. 40, 'Cellini and the Pope,' marked 1840, exhibits a very well-painted Apostolic *Virtuoso*, and a wretched apology for the spiritual artist and vivacious self-biographer. We cannot land No. 84, 'The White Boy's Cabin,' 1836, a piece of sickly romance, as untruthful in costume as capricious in mechanism. Wilkie's mannered style distinguishes itself by a certain *streakiness* of touch, that he either mistook himself, or thought the world would mistake, for freedom. His pictures often look as if they had been rained upon, and that their tints ran down their surfaces, like drops down a window after a heavy shower.

If from Wilkie's explorativeness, or unsteadiness, he has not bequeathed us perfection in any one style, we must be content with the varied nature of our heritage; we must accept the dross and virgin ore together, when even the former has its value. Besides the three styles just named, but not numbered, let us specify a tenth, designating it as the *Seventh*, or *Mixed* style, because it comprises several good pictures, on which he employed two or more at once of his previous manners, and oftentimes a new transitory method also. No. 42, 'The Parish Beadle,' 1823, a work of powerful black-and-white effect: this chiaroscuro in masses is a very simple thing compared to the chiaroscuro in detail, that keeps all figures and forms distinct from each other by a skilful system of reliefs, yet connects them by neutral gradations into a whole. What miracle-workers the Dutchmen were, as chiaroscuroists of the latter description! How far above Wilkie's best attempt is No. 163, 'Dutch Boors,' which is not Teniers's best, or No. 159, 'An Interior,' or even *Jan Steen's* 'Itinerant Musicians,' No. 145, more remarkable for burlesque, broad humour, than mellow treatment. But several faces in the 'Parish Beadle' are admirably painted, with Correggio's globular contours and smooth enamelled skins well imitated: the personages need no labels out of their mouths, or windows in their breasts, to let us see what they are saying and thinking;—character abounds, the shrill Virago, the weather-beaten Picaroon, authoritative Beadle, awe-stricken dog, and monkey subdued from restless vigilance into quiet contemplation upon the changes and chances of human life, &c. No. 61, 'The Highland Family,' 1824, has similar impasta, but less effect, and altogether much less merit. No. 1, 'George the Fourth's entrance into Holyrood Palace,' 1829: the King's face delicately painted, and one or two other "bits" very clever; for the rest—leather and prunella! No. 10, 'John Knox Preaching': like the last, half obliterated, though but ten years old—the background figures a mere puddle of varicolored paints—a Spanish blister! We scarce regret it—Wilkie's historical attempts were sad perversions of his powers. There is a comic side to Knox's most serious character, which Scott, as a painter, might have seized: Wilkie's hero of the Northern Reformation brings to mind Hogarth's Methodist preacher, who splits the pulpit canopy with the force of his vulgar elocution, and would have made religion ridiculous in his person to a rational people like our neighbours. See *Athen.* No. 758, for further remarks on Wilkie's different conceptions of this subject; and on his 'School,' an unfinished picture, which combines the rural drama of his earlier styles with the Correggicque contour and surface, and with the mannered character of his later mechanism likewise. We can say little decisive respecting a work exhibited two seasons since, 'The Whiskey Still'; as well as we remember, it is similar in general spirit to the 'School,' but does not perform all the last-cited production's promises. No. 51, 'Queen Mary's departure from Lochleven,' 1837, a specimen of hollow *chiaroscuro*.

Wilkie's Portraits are admitted failures, yet would be triumphs for many an artist known by nothing superior. Fine portraiture, however, if not above his reach, was out of it: those two very subordinate spec-

\* Vide *Athenæum*, No. 769, p. 458, for a description.

cimens by Reynolds, Nos. 167 and 176, exhibit the real principles of this peculiar art better than 'Mrs. Maberly,' No. 109, and all her companions, though her likeness has a charm we failed to discover in the celebrated 'Lady Lyndhurst,' No. 58.

One moment and sentence must suffice to record our admiration of No. 171, 'A Cottage Girl,' and No. 175, 'A Sea Shore,' by Gainsborough. We hoped that leisure would have permitted us to institute a comparison between the genius in them, and in the Wilkies, in the earlier and later Schools of British Art; but we are glad, on reflection, to suppress such a piece of criticism.

### MUSIC AND THE DRAMA

**PHILHARMONIC SOCIETY.**—Saturday last was a stormy day for music. In the morning, a manifestation took place at the Philharmonic rehearsal, to which we are bound to advert, having denounced the offence against good taste at a former concert, which gave rise to it. On the appearance of one of the hisses of Thalberg, he was received by the whole orchestra, according to preconcerted arrangement, after the vulgar fashion of his own proceeding. Nothing can be worse than this. Billingsgate for Billingsgate is the resource of fishwives. To what moral purpose are the arts practised, if their most cultivated professors have no better idea of social propriety than their brethren of the booth and the hardy-gurdy? The Philharmonic authorities and performers had easy means of recording their displeasure, without going down into the mire to pelt those who had pelted them with mud. Monday's concert, the last for the year, was very brilliant: thanks to Dr. Mendelssohn-Bartholdy's second pianoforte concerto, and thanks to him for conducting his own beautiful overture to the 'Isles of Fingal,' which was *encored*. The concerto, whether as a composition or as a performance, would demand an article to itself, had we space at will. Rarely has so superb a composition been so superbly interpreted; and gave us great pleasure to witness the rapturous enthusiasm with which it was received.

**MUSIC OF THE WEEK.**—We must condense our chronicle of the other music of the week into the smallest possible space, beginning with the *Hamburg Concert* given yesterday week: an entertainment in every sense of the word successful. Its most interesting features were the pianoforte playing of Moscheles and of Mendelssohn-Bartholdy, and Miss Kemble's admirable singing. After the *encore* in the 'Frühlings Lied,' she took the 'Erl König' of Schubert at a moment's warning, to replace Madame Stöckl Heinefetter. Her delivery of this, with Thalberg's accompaniment, was one of the most remarkable things of the season. We are indebted to Miss Kemble for another of our musical *memorabilia* for 1842; this was her singing, at the concerts of *Signor Ronzi* and *Mr. Balfé*, of M. Dessauer's ballad to Tennyson's poem of 'The Sisters'; a composition the rare individuality of which cannot be praised as it deserves, within our present limits.

The Italian Opera is so uncertain in its proceedings that we are willing to postpone a few words on its last novelties, simply recording the terrific riot on Saturday, caused by the postponement of 'I Puritani.' The German operatic season closes this evening.—'Les Huguenots' having failed to fill the treasury,—and no wonder, its imperfect execution considered. We were prepared for the scanty justice which our contemporaries have extended towards this opera as a composition,—amused to find the performance lauded by some as magnificent in its finish, while others have taken occasion to ring the cuckoo-chime of folly once again about the music of the French. Under circumstances, the 'Stabat' of Rossini claims precedence; but we shall not forget our purpose of returning to the opera, opportunity permitting.

**Rossini's 'Stabat Mater.'**—Two performances of this much-talked-of composition within the week, and a third announced at the Opera, make our promised remarks reasonable. But, first, we have a word to say to the *Professional Choral Society*, by whom a garbled version of the 'Stabat,' without orchestra and with secular Italian text, was brought

forward on Wednesday. We object to all such proceedings, on the same principle as led us to remonstrate against interpolations in 'Acis and Galatea,' and the conversion of Mozart's 'Requiem' into an oratorio. To pretend to know better than a composer, what his music means, is a gross presumption; if we endure that additional accompaniments should be added to a Handel's music, it must be by a Mozart. While, again, the attempt to replace the rich support of a full band by a feeble violoncello, a tinkling pianoforte and a hoarse organ, is a measure at once too absurd and unjust in its parsimony to pass without our strongest reprobation. How large a portion of the effect of the 'Stabat' lies in the exquisite structure of its accompaniments, we felt yesterday morning, while listening to the performance at the Prince's Theatre, where the beautiful singing of Mlle. Lutzer, Mlle. Pacini, Signor Mario, Herr Staudigl, and a very steady chorus, was set off by an orchestra at once powerful and delicate, well conducted by Signor Gabussi. These remarks made, let us consider Rossini's last work on its own merits. The larger portion of musical connoisseurs, we are aware, are too glad to avail themselves of Jules Janin's epithet of "*joli*," as a well-weighed criticism, in place of rating it as a smart word flung about at random. Forms too secular, graces too mundane, pathos too sensual will be objected to this 'Stabat'; and, in truth, to venture a simile, it is more like one of the saints of the Venetian school, curled and bejewelled, with moist and voluptuous eyes and heaving bosom, than such a holy virgin (angelic while on earth) as a Fra Beato delighted to paint. But such a specimen is not unique in art; for the Catholic and Protestant schools of music afford countless examples of a like confusion between profane passions and spiritual aspirations,—the stage and the church. The 'Stabat' of Pergolesi was—according to its day—little more severe in its forms than the theatrical music of its composer; the masses of Haydn and Mozart are full of airs, choruses, vocal divisions, and harmonic changes, which are common to their masters' lighter works; nay, some of the most pompous motets by the latter, are neither more nor less than incidental music introduced into dramas,—and since mated with scriptural words. The double occupation to which Handel's opera songs have been put, needs hardly to be pointed out. Beethoven's 'Mount of Olives' is, throughout, full of passages, as directly and dramatically captivating as any part of the 'Fidelio'; while a later and inferior composer, Spohr,—who, nevertheless, also belongs to that intellectual school, in which the diversities of thought and subject are studied,—not only uses the same harmonic chords, the same orchestral devices, in his serious and secular works, but identically the same forms and cadences. Here and there, among the Catholics a Cherubini, among the Protestants a Mendelssohn\* may be found, versatile enough in his strength to display different powers in the service of the sanctuary and of the banquet hall; but such make the exceptions and not the rule; for which reason it seems to us that those who have cried out upon Rossini for continuing to be Rossini, have forgotten how severe an implied reproach their denunciation casts back upon some of the most eminent of their own classical idols. These necessary allowances made, the purist may find much to admire in the 'Stabat.' There is a grave and harmonious

\* See the recently published ninety-fifth psalm, set by this greatest of modern composers (op. 46), one of a series worthily bearing out the religious spirit of the 'St. Paul.' A more cheerful movement of praise does not occur to us than the chorus (No. 2.) 'Come let us sing,' nor a more graceful duet than that to the words, 'In his hands are all the corners of the earth'; yet it would be impossible, with any chance of effect, to detach these from the sacred text to which they were originally written. A few days since we were present at a perusal of the choral music to the 'Antigone,' which has excited such a sensation in Berlin; and by nothing were we more struck than by the Pagan and dramatic (as opposed to Christian and religious) tone imparted to compositions so stately and solemn in their character, that any one less clear in intellectual vision, less forcible in the command of his resources, than Mendelssohn, must have crossed the line which separated the two schools, and confounded the severest dramatic with the noblest religious emotions. Our note is already too long, and we have much more to say on a future occasion, touching these Antigone choruses. To return, for a last word, to the Psalm, it is a pity that the English text has been so stiffly and ungraciously adapted to the music. Departure from the precise language of the psalmist being inevitable, much might have been done for euphony, ease, and emphasis, which is here unattempted.

melancholy in the first verse, wrought out with the ease of consummate mastery, and heightened by certain picturesque touches (especially towards the close), which it is hard to resist. The tenor air, immediately following, is one of the three *marcans*, in which the composer is most essentially operatic,—the duet for two *soprani* (No. 3.), and the quatuor (No. 6.) being the other two. Indeed, its commencement largely partakes of the character of the tenor's music in 'Guillaume Tell';—yet the second part of the movement, and again its final passage, have an intensity of passion which may possibly belong to the theatre; but which we dare no more shut out of the (Italian) church than we dare banish from it those impulsive worshippers, who will one moment be throwing about their *lazzi* in the portal, and, two seconds afterwards, be weeping on their knees, and beating their breasts before some dreaded or compassionate Saint. The duet for two *soprani* is of a calmer character,—in its sumptuous vocal sweetness equalling its master's former gorgeous *large* movements *à due voci*. To this succeeds the bass air 'Pro peccatis,' in itself among the finest modern songs of its class,—how much more so when sung by a Staudigl! We need not point, to those who have heard it thus performed, to the deep expression which a singer can impart to the sequence of a major, to a sharp major, on the last repetition of the words 'Morientem, desolatum,'—a simple stroke of the pen, it is true, but which few have sufficient courage or nature so happily to manage. The unaccompanied chorus and recitative (No. 5.), are, to us, but unsatisfactory. Though the 'Stabat' contains no finerie of harmony than the passage given to the words 'Ut sibi complacem,' and the effect of the whole is most imposing, the movement seems to us too fragmentary, the phrase, with its syncope, having more rhythm than reason. The quatuor (No. 6.) 'Sancta Mater,' is beautifully melodious, and written with Rossini's usual effect, but with less elevation of tone, we think, than any other part of the 'Stabat.' The *contralto* song (No. 7.) 'Fue ut portem,' is remarkable for the manner in which the time is managed,—the usual *laissez aller* swing of the triple rhythm being completely destroyed by a happy, yet artificial, distribution of accent and emphasis. We are now at the air and chorus 'Inflammatus' (No. 8.), which is admirably wrought up from the first unions of the chorus, through the exciting climax of antiphonies between the *solo* treble voice and the full quartet of voices to the last burst of pompous brilliancy. Here, again, tried by the canons of ecclesiastical composition, the orchestra may be found too dramatically florid, though hardly more so than in the splendid episodic melody in Beethoven's 'Hallelujah' chorus; but Rossini has been all his life an audacious despiser of canons when as sure of his effect as in the present instance: and when he has in reserve as excellent a *placebo* for the lovers of grave forms and delicate harmonies, as the unaccompanied quatuor 'Quando corpora,' which immediately succeeds this sacred *bravura*. Nothing, indeed, but a contrast so complete could have been endured. Here, however, the dramatic tendencies of the *maestro* peep out, in spite of himself: the rests, the dotted notes, the sudden alternations of *piano* and *forte*, by which the interest is everywhere suspended, and the ear made absolutely to thirst for the long drawn repose of the pedal close, impart (let not the word be misunderstood) a certain vivacity of effect, even to a composition, in which the colouring is sombre, and the subject spiritual. We cannot admire the final fugue: but the art of constructing such movements is so fallen even in Germany, that we must not be hard upon our buoyant Italian, if his devices and designs are like those of a schoolboy. So far from it, we can part from him with delight, for the sake of the picturesque return to the opening phrase of the 'Stabat,' introduced just ere its close. In short, every perusal and hearing of this composition satisfies us of the justice of the defence we have so feebly offered. To call the 'Stabat' a composition of the highest class would be absurd; but to degrade it among the trumpery music of the modern Italians is an injustice. It may take its place by the side of the service-music of Haydn and Mozart,—the 'Passione' of the former, and the 'Requiem' of the latter, being, of course, exempted from comparison.



TWELFTH MEETING OF THE BRITISH ASSOCIATION  
FOR THE ADVANCEMENT OF SCIENCE.

[From our own Correspondents.]

THURSDAY, JUNE 23.

SECTION A.—MATHEMATICAL AND PHYSICAL  
SCIENCE.

**President**—The Very Rev. G. PEACOCK, Dean of Ely.  
**Vice-Presidents**—Sir D. BREWSTER, Sir T. M. BRIDGES,  
 Prof. LLOYD, Sir W. HAMILTON,  
 Secretary—Prof. STEVENS, Rev. W. SCORSEBY, Prof. McCULLAGH.  
**Committee**—The Earl of Rosebery, Professors Bessel and Erman, Col.  
 Sabine, Rev. W. Whewell, Prof. J. Phillips, Sir J. F. W. Herschel,  
 Messrs. S. E. Cotton, W. S. Harris, Professors Fricke, Brachmann  
 (of Moscow), Jacob (of Königsberg), Messrs. J. S. Russell,  
 F. Oiler, Rev. Prof. Powell, Rev. D. Gray, Col. Sykes, Mr. H. F.  
 Talbot, Prof. Mosely, Mr. L. Howard.

THE PRESIDENT briefly addressed the meeting.

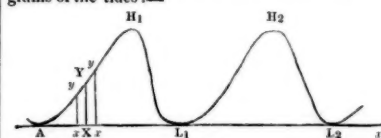
Sir DAVID BREWSTER gave a provisional Report respecting the erection of one of Mr. Osler's anemometers at Inverness, one of the stations at which hourly observations with the barometer and thermometer have been made, at the expense of the British Association. Owing to the difficulty of obtaining a suitable place for the erection of the anemometer, the observations did not commence till the 15th of April. The indications of the rain gauge commenced on the 6th of May, so that a complete series of observations for one year will be laid before the meeting of the Association for 1843; those observations are registered and superintended by Mr. Thomas Mackenzie and the Rev. Mr. Gray, rector of the Royal Academy of Inverness.

Sir David Brewster likewise made a provisional Report, 'On the Hourly Series of Meteorological Observations made at Inverness during the Meteorological year from the 1st of November, 1840, to the 1st of November, 1841.'—The mean temperature of Inverness for the summer months was  $52^{\circ}.258$ ; the mean temperature of the winter months  $40^{\circ}.287$ ; and the mean temperature for the whole year  $46^{\circ}.272$ . This mean temperature occurred at  $8^h 33^m$  A.M. and  $7^h 42^m$ , the critical interval being  $11^h 9^m$ , differing only a few minutes from the result obtained by similar hourly observations made at Leith. The observations made with the barometer, when reduced to the level of the sea, and to the temperature of  $60^{\circ}$ , indicate very distinctly the daily variation, with its two maxima and minima. The mean annual average of all the observations was 29.680 inches. The monthly mean indicated a *maximum* in December and in June, and a *minimum* in March and in October.

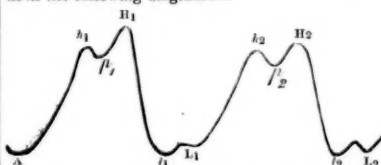
Prof. PHILLIPS called attention to the remarkable character of the curves of barometric oscillation which appeared derivable from these observations. As he understood the statement, the hours of maximum and minimum were found to be very different from, and even in contrast with those at which the oscillations occurred further south, as, for example, about London. He pointed out the support which these observations lent to the formulae of barometric oscillations in various latitudes and at different elevations, given in the Edinburgh Philosophical Transactions. The PRESIDENT considered these and all such observations to possess the deepest interest; it was only by their aid that there was the least probability of discovering the general laws which obtained in the most intricate and often perplexing phenomena of meteorology. Observations, as formerly conducted, were too few, too little extended, and continued for too short periods, to give any chance of discovering these laws.

Mr. SCOTT RUSSELL presented a 'Report on the Abnormal Tides of the Firth of Forth,' supplemental to a former Report on the same subject (*Athen.* No. 675).—He had on a former occasion presented to the section the result of tidal observations on the Frith of Forth. These observations brought to light the existence of certain very remarkable tidal phenomena, proving the occurrence, on some parts of that Frith, of double tides, or rather perhaps of quadruple tides, being four high waters in each day, instead of only two, as usual. When this subject was formerly discussed, Mr. Russell had attributed these anomalies to the great southern tide wave entering the Firth at a different period from the great northern tide wave, to which the periods of high and low water on the east coast of Britain are principally due. But other explanations had also been suggested in quarters so high as to entitle them to great respect. For the purpose of settling this question, and, if possible, reducing these anomalous tides to some law, Mr. Russell had re-

cently instituted a second series of observations on the tides of the Firth of Forth, conducted under very careful observers, the height of the tide being observed simultaneously by different observers, at the different stations, who recorded their observations every five minutes, and continued them unceasingly night and day. They had only as yet extended over a few weeks, but already there had come out of them results of a decided character, so as to set at rest the question of the origin of these tides, and to illustrate some curious points in the history of littoral tides. The tides already observed had, he thought, proved the accuracy of the theory he had formerly advanced on this subject. But it would still be desirable that these observations should be continued and extended. He then proceeded to exhibit the results of the observations in a series of accurate diagrams of the tides:—



This diagram represents the two successive tides of a day, as usually observed on the coast of Britain. The line  $Ax$ , being on the level of a given low water, is divided into equal portions, representing hours, minutes, &c., and lines perpendicular to  $Ax$ , namely,  $xy$ ,  $xy$ ,  $xy$ , proportioned to the successive heights, so that  $H_1$  is high water in the morning,  $H_2$  is high water in the evening,  $L_1$  and  $L_2$  being the succeeding low waters. In this case the tides exhibit the usual form, and at the mouth of the Firth they are in tolerably close accordance with it. In the upper parts of the Firth they deviate from it very widely, as in the following diagram:—



These diagrams exhibit the following changes produced in the tidal course. First of all, we have the tide rising to high water at  $h_1$ , falling to a low water at  $p_1$ , rising to a second high water at  $H_1$ , with a very small low water at  $p_1$  between them; then we have at the low waters  $L_1$  and  $L_2$  an elevation, and two depressions of an equally anomalous kind. It also appears that the range or rise and fall of tide increases as it travels, instead of diminishing. As these observations were reduced to the same level, it further appeared that the high water mark at Leith, by ten to fifteen feet. These diagrams, being compared with the plan of the Firth, serve to show the effect of form of channel on the wave. Mr. Russell then proceeded to his explanation of these anomalous phenomena. He referred to the very great progress which had recently been made in our knowledge of the laws and phenomena of the tides. Mr. Lubbock had succeeded in deriving all the principal phenomena of the tides, most accurately from the equilibrium theory of Bernoulli; Mr. Whewell had constructed, from the discussion of a multitude of simultaneous observations, empirical formulae by which the progress of the tide wave had been represented with a high degree of accuracy, and the theory of the tides had attained a high degree of perfection. But there still remained a multitude of anomalous facts for which received theory could not account, and amongst this number were these refractory double tides. Mr. Russell's theory is this: that the tidal wave is a compound wave of the first order; that its phenomena are correctly represented by the wave which he has called the great wave of translation—that this tide's motion along our shores is correctly represented by this type. Now the wave of translation in ascending a channel whose breadth and depth vary, exhibits the following phenomena:—First, a velocity varying as the square root of the depth of the channel; second, an increase of height with the diminution in breadth and in depth of the channel; third,

a dislocation of the centre, which is transferred forwards in the direction of transmission according to a simple and well-established law. And these changes exactly correspond to the epoch of high water, the law of rise and fall, and the exaggeration of range in the Firth of Forth. Of the four successive high waters of each day, he has ascertained the latter tide of each pair to be *normal* and the earlier the abnormal tide. It is well known that the tide which brings high water to the east coast of Britain, as far as at least as the Thames, comes round the north of Britain, and bringing high water to Aberdeen about noon, Leith about two, and London about twelve o'clock at spring tides. This wave is the same which brings to the whole of the Firth of Forth the normal high water, and of the double tides the *later* of each pair corresponds exactly with the time as predicted by the excellent tables of Mr. Lubbock. But if we conceive the great southern wave, which comes up the English Channel, to continue its course northwards in the opposite direction to the normal tide, it would enter the Forth at ten o'clock, being two hours previous to the normal tide, due to the succeeding transit of the moon, or the tide E at Leith will consist of the normal tide due to transit B and the abnormal tide due to transit A. Now the double tides are in exact correspondence with these conditions, the abnormal tide being generally about two hours in advance of the normal tide. But the circumstance which most perfectly fixes the identity of the tides, as due to the successive transits A and B, is found in the character of their diurnal irregularities. If the theory adduced be correct, the normal and the abnormal tides will have opposite inequalities. The observations made exactly correspond with this view; and, so far as they go, establish the soundness of the view which has been adduced for their explanation. Another remarkable confirmation of this view is derived from the examination of the diurnal inequality of places on opposite coasts at the mouth of the Forth, the diurnal inequality on the south side being that due to the northern or normal tide, and that on the northern coast being that due to the abnormal or southern tide wave. At Leith both waves meet, and the inequalities nearly neutralize each other, and give only the difference of the inequalities. By the same process, using the wave of translation as a type of the tide wave, some further anomalies of the tide wave were explained, and the absence of all tide frequently observed on opposite and adjacent coasts, as at the north of Scotland, and the opposite coast of Norway. These are explained by the fact that the lateral transmission of the wave is slower than its transmission in the direction of its amplitude, so that the rapid advancement of one portion of the wave gives divergence to the branches, which thus separate and leave an interval of diminished tide or of no tide.

Mr. WHEWELL inquired, whether Mr. Russell's explanation of the double tides supposed the two waves arising from the two tide waves (the northern and southern) to be superimposed; and remarked, that in this case the difference of successive tides was so small, (only an inch or two) that it required a considerable series of observations to establish its real existence. He remarked, that the difference of the phenomena of tides on different parts of the shore of the same basin is very conspicuous in many places, and appears to confirm the view of the separate transmissions of concurrent waves presented by Mr. Scott Russell, but that this doctrine is still somewhat meagre; and though it appears to account for the phenomena in the present case, must be considered as short of absolute certainty.—Mr. HOLDEN observed that we have on the west coast in Lancashire, a mile to the north of Southport, a secondary tide, in fine calm weather. The tide comes to the height, and then retires a good way, and in fifteen minutes returns to the same height again. This secondary tide is that which comes round Ireland, and, passing through the Mull of Galloway, comes a little later to our coast.—In reply, Mr. Scott Russell stated, that he perfectly agreed with Mr. Whewell in thinking that it was desirable to have the subject ascertained by a still more extensive series of experiments, and that observations were now actually in progress with that view.—The Rev. Dr. SCORSEBY had frequently at sea seen several courses of waves, each pursuing its own track underridingly, although

crossing the tracks of others at various angles. At the places where the crests of one series of waves crossed the crests of the waves of another series, these knots were formed, and it was this circumstance which the sailor dreaded; for if the wind blew ever so violently from one fixed quarter, it only raised one series of parallel waves, and these, however lofty, were never dreaded by the sailors; but when the wind, after blowing violently from one point, shifted suddenly a few points, a new series of parallel waves was generated, crossing the former series, and at the knots the waves accumulated the one on the other, while the trough of each deepened the trough of the other between every four knots; hence the forms of the waves also were so much deranged that the crests topped over, and breakers were formed. These cross seas were what the sailor had chiefly to dread.—Mr. Russell said that the waves of which Dr. Scoresby spoke were the oscillating waves of the sea; these were quite unlike waves of translation, of which alone he had been speaking, both in their structure and in the laws which they observed.—The President remarked, that if Mr. Russell established the fact, which he had now so ably brought before the Section, of the separate individuality, even when they had blended, of different waves of translation, so that they were capable of again separating under their proper conditions, he conceived that he had added a new and important fact to those previously established on the subject.

Mr. DENT reported 'On his Chronometrical Experiment to determine the difference of Meridians between Greenwich and Devonport.'—The following are the results:

	m. s.
Longitude of landing place on Breakwater by four chronometers .....	16 33.60 west,
Longitude of staff on Mount Wise by Trigonometrical survey .....	16 38.1
By mean of four chronometers .....	16 38.8
Difference .....	1.7

Mr. Dent also reported respecting his Steel Balance Spring, coated with pure gold by the electro-metallurgical process; also of the performance of his clock, in which the impulse is given to the pendulum at or near the centre of percussion. By this contrivance he proposed to obviate the difficulty occasioned by the oil freezing at low temperatures. The stopping of clocks at very low temperatures had induced the Astronomer Royal to invent a new escapement, which seemed to answer all the conditions required; an addition of twelve pounds could be added on to the weight of the clock, and yet a variation was produced in the arc of vibration amounting to only five minutes, while an addition of one pound to the weight of the ordinary Graham's escapement, made a difference of fifteen minutes; by Mr. Airy's plan there was always (if the term might be used) an extra reservoir of force; keeping the train of wheels always up to their work, and capable of overcoming the resistance occasioned by the freezing of the oil. Mr. Dent then explained the principle of his patent Compensation-balance.

Mr. FRODSHAM made some remarks on the compensation balance of chronometers, and explained a new compensation balance of his invention.—Sir THOMAS BRISBANE said, that praise was due to Mr. Dent as the first maker who had exerted himself to determine the difference of meridians by chronometers. He had shown, that by chronometers the difference of longitude could be had with as much certainty as by any other method in use, and at an expense bearing no proportion to that of rockets, or any other means hitherto adopted. Dr. Robinson, of Armagh, was at present engaged in a series of rocket observations in Ireland. It had been the intention of Dr. Robinson to connect the Irish with the Scotch observatories, and for that purpose a large depot of rockets had been obtained from government, and stood in Dumbarton Castle, but unfortunately the unfavourable weather in spring had prevented the execution of the design, and he had received a letter, within a few days, from Dr. Robinson, stating that the strong twilights of the present season would make it requisite to postpone the work until autumn: these facts would at once convince the Section of the superior economy and saving of time to be attained by adopting Mr. Dent's suggestion of chronometrical observations.—Mr.

HOLDEN inquired, why the method of moon-culminating stars, which was so simple and easy of application, was not preferred to any other in determining longitudes?—Sir Thomas Brisbane replied, that to say nothing of the heavier amount of labour required in such observations, he need only, in order to show the superiority of Mr. Dent's method, state the fact, that in a late attempt to connect the Royal Observatories of London and Paris, backed by all the instrumental accuracy and unrivalled skill of the observers at these two distinguished observatories, 300 observations on moon culminating stars had given a mean deviating no less than thirty seconds from the truth.—The President observed, that although the method of moon culminating stars had, in theory, promised considerable accuracy in the determinations of longitudes, yet from some unexplained difficulties it had, in practice, fallen far below the estimate that had been formed of it.

## FRIDAY.

'Report of the Committee for the Reduction of the Stars in the Histoire Celeste.'

June 16, 1842.

I have the satisfaction of reporting that the whole of the stars in the *Histoire Celeste* have been reduced, agreeably to the method proposed: those only being omitted for which there are no tables of reduction, and that there is now remaining, of the grant for this purpose, the sum of 50*l.*, which will not be required in the further prosecution of this portion of the work. But the main object of this undertaking will be defeated, if the catalogue be not printed for general use and information. The number of stars reduced is upwards of 47,000; and I have caused an estimate to be made of the expense of printing 500 copies in an octavo form. And it appears that the cost of paper and printing will be about 435*l.*, but that 1000 copies will cost 100*l.* more. There is, however, another expense which must be taken into the account, which is the copying of the catalogue, in a proper order for the press, and the correction of the press during the printing, which I apprehend will be 60*l.* or 70*l.* more. Taking the whole of these estimates together, it would appear, that 500 copies would cost about 500*l.*, and that 1000 copies would cost about 600*l.* Should the British Association decide on the printing of the catalogue, I would draw up a statement of the method pursued in making the reductions, together with such other remarks as might be requisite. This probably would not add another sheet to the work.

FRANCIS BAILY.

The President briefly pointed out to the Section the vast importance of the reduction of this valuable catalogue of stars given by Lalande, and the almost worthlessness of the catalogue without that reduction.

'Report of the Committee on the British Association Catalogue of Stars.'

I have the honour to report on the subject of this catalogue, that the calculations of the places of the stars, with the annual precessions, secular variations, and proper motions, together with the logarithms of the requisite constants, are completed for nearly 8,300 stars, which is about the number originally contemplated: that the same are fairly copied out for the press; and that the construction of the table of synonims is now in progress, two-thirds of which are already completed: that the whole of the sum granted at the last meeting of the Association has been expended, and that a further sum of 25*l.* will be required for the completion of some of the above stars, peculiar portions, and for the final completion of the synonims: that the above sum of 25*l.* is all that will be wanting in future, as Mr. Farley (the principal computer and superintendent) has undertaken to complete the work, ready for the press, without any further remuneration, and which will be ready for delivery in a few weeks. Under these circumstances, I have caused an estimate to be made of the expense of printing the same: and I find, that the cost of paper and printing 500 copies in quarto, will be about 350*l.*, but that 1000 copies will cost 150*l.* more. It will be requisite, however, to employ some one to correct the press, and to superintend the arrangement of the work, which will add to the expense here mentioned. A pretty large preface will be requisite, explanatory of the mode adopted in bringing up the several stars to the given epoch, and of various circumstances connected with the investigation, as well as descriptive of the method of using the catalogue in its present form. But on these points I am willing to render any assistance in my power.

FRANCIS BAILY.

'Report of the Committee for the Reduction of Lacaille's Stars.'

Collingwood, June 3, 1842.

A Committee having been appointed, consisting of myself, Mr. Henderson, and Mr. Airy, for the purpose of effecting the reduction of Lacaille's stars, I have the pleasure to report, that under the superintendence of Mr. Henderson, the whole of that work is now completed, and the resulting catalogue, being arranged in order of right ascension, is fairly written out and ready for press. The total number of stars reduced and catalogued, is about 10,000—the sum of 105*l.* remaining of the original grant unappropriated; which the Committee recommend to be applied (with such additional grant as may be needed) to the printing and publication of the catalogue, without which, it is evident, that little or no benefit can result to Astronomical Science from the work so accomplished. With the catalogue, and forming an introduction to it, an account of the process pursued in the reductions, the constants used, and all other matter needful for a complete understanding of the work, ought also to be printed, and should it be the pleasure of the Asso-

ciation to order the publication, will be furnished by Mr. Henderson. The estimated cost of the publication so recommended, may be roughly stated at about 250*l.* for printing, paper, &c. of 500 copies of the catalogue and introduction.

J. F. W. HERSCHTEL.

The President observed, that the discussion and publication of these Observations upon the stars of the southern hemisphere, originally made by M. de Lacaille, now possessed an increased interest in consequence of the recent observations of Sir John Herschel, prosecuted at precisely the same locality, thus furnishing two series of observations upon the same stars at epochs separated by a very considerable interval of time.

Col. Sabine read the Report of the Committee for the translation and publication of Foreign Scientific Memoirs.

Since the last meeting of the British Association the Committee have obtained and published in the ninth number of Taylor's Foreign Scientific Journal, translations of the two following works, viz.—*Gauss*, 'General Propositions relating to Attractive and Repulsive Forces, acting in the inverse ratio of the square of the distance'; *Dove*, 'On the Law of Storms.'—These translations were presented to the Committee by Lieut.-Col. Sabine, and as no illustrations were requisite, it has not been necessary to expend any portion of the grant placed at the disposal of the Committee.

'On the existence of a New Neutral Point, and two Secondary Neutral Points,' by Sir David Brewster.—After noticing the two neutral points (points where there is no polarization of light) of MM. Arago and Babinet, Sir D. Brewster said he had discovered a third. He also mentioned amongst some general results of observations continued for a long time, that instead of the point of maximum polarization being always, as supposed, at 90° from the sun, he had found it more frequently 88° from the sun. He also described a polarimeter or polariscope, by which, he said, the rectilinear bands in polarization were seen more clearly than by other methods.

'On certain Cases of Elliptically Polarized Light,' by Prof. Powell.—At the last meeting of the Association, Prof. Lloyd gave a theoretical investigation of certain results obtained by Sir D. Brewster relative to thin films from which polarized light is reflected. Besides completely explaining those results, Prof. Lloyd infers, that such films ought to give the portions of light reflected at their two surfaces differing in phase, and that the light should be consequently in general elliptically polarized. The author of the present paper, before he was aware of the investigation of Prof. Lloyd, had made many observations on the elliptical polarization of light by reflection from metallic and other surfaces,—the method of observation being by the well known displacement of the polarized rings. Some of these experiments went merely to prove the existence of elliptic polarization in cases where it had not previously been detected, as in certain minerals and other bodies in which it is seen, though of small amount. In other cases the reflecting surface consisted of the thin films formed on polished metal by tarnish, by heat, or by the galvanic process of Nobili. In these instances, a verification was afforded of Prof. Lloyd's theory by direct observation. But, further,—these films give periodic colours; and in passing from one tint to another, the ellipticity, as disclosed by the form of the rings, underwent regular changes, passing from a dislocation in one direction to the opposite, through points of no dislocation or of plane polarization, the rings being alternately dark and bright centered. This afforded a further field for the application of theory, and Mr. Airy investigated a formula for the rings under these varying conditions, with which the phenomena are in perfect accordance.

Mr. SCOTT RUSSELL communicated to the Section the results of experiments recently made by him, and which he wished to present as a supplement to the former Report of a Committee on Waves. [*Athenæum*, Nos. 517, 565, 566, 618, 675.] On former occasions he had submitted to the Section observations that were principally directed to the examination of one kind of wave, but his present communication referred to new and beautiful phenomena of a different class. Much of the difficulty experienced in attaining clear conceptions of the phenomena and mechanism of waves is to be attributed to this circumstance, that we are apt to confound with each other, under the general name of wave motion, a variety of phenomena essentially different in their origin, their form, and their laws. This essential diversity the author of this paper had formerly en-

deavour  
of that s  
of trans  
in 1834  
describ  
of wave  
the Ass  
opportu  
turing a  
the Sec  
orders  
first ord  
gressive  
has two  
of the s  
gious i  
amplitu  
and stat  
capillary  
superfici  
capillary  
short in  
The last  
examine  
tion of  
which w  
examine  
the auth  
own, wh  
Poncele  
nounce  
running  
notice, o  
any one  
waves or  
he had t  
The wav  
Scott R  
brass wi  
and dra  
When t  
of the w  
and regu  
point, a  
of a co  
tance of  
determin  
the excit  
of an in  
several f  
mena as  
in an ex  
given, a

These  
in free  
them in  
in free  
and fou  
freely,  
second,  
sible in  
not long  
their br  
and just  
nearly a  
phenom  
generati  
surface  
reflecti  
observed  
motion,  
compre  
always  
exciting  
waves  
observa  
rating t  
observ  
deduced  
getting



devooured to establish, more especially in the case of that species of wave which he had called the wave of translation. In his memoir of observations made in 1834-1835, he had indicated the existence and described some of the phenomena of two other classes of waves, as also in the former printed Reports of the Association. But he had lately embraced an opportunity of extending his observations, and maturing a classification, which he now submitted to the Section. Of waves there seem to be three great orders, obeying very different laws:—1, Wave of the first order,—the wave of translation,—is solitary, progressive, depending chiefly on the depth of the fluid: has two species, positive and negative. 2, The waves of the second order,—the oscillatory waves,—are gregarious; the time of oscillation depending on the amplitude of the wave: of two species, progressive and stationary. 3, The waves of the third order,—capillary waves; gregarious. The oscillations of the superficial film of a fluid, under the influence of the capillary forces, extending to a very minute depth: short in duration: of two species: free, constrained. The last of these classes he had not before minutely examined, and to them he wished to draw the attention of the Section, as amongst the phenomena which we most frequently see, and have yet failed to examine. Although these waves were noticed by the author in 1834, and figured in a memoir of his own, which drawing had since been published by M. Poncelet, in his "Mécanique," along with an announcement that he had observed the same waves in running water; yet they had not hitherto attracted notice, or been thoroughly examined by Mr. Russell or any one else. He believed them to be the minute waves or dents indicated by the theory of Poisson; he had therefore thought it his duty to examine them. The waves of the third order were observed by Mr. Scott Russell in the following manner:—a slender brass wire was inserted vertically into a still fluid, and drawn in that position slowly along its surface. When the velocity is one foot per second the surface of the water exhibits a group of waves of great beauty and regularity, extending forwards before the exciting point, and spreading on both sides of it in the form of a co-focal group of hyperbolas; the focal distance of each hyperbola, and its asymptotes being determined by the velocity of the motion. Although the exciting point was of no more than one-sixteenth of an inch in diameter, these waves extend over several feet, and the diagrams exhibited the phenomena as having great regularity and beauty. Numerical results, showing the number of these waves in an inch of distance from the exciting point was given, and is nearly as follows:—

Velocity of moving point. Feet per min.	Number of Waves in an inch.
55	2
60	3
65	4
72	5
80	6
90	7
103	8
120	9

These waves were examples of capillary waves, not in free but constrained motion. He had generated them in a different manner, so as to examine them in free motion, uninfluenced by the generating point, and found that the capillary waves, when moving freely, have a constant velocity of 8½ inches per second, that their duration is short, becoming insensible after about twelve seconds after describing a path not longer than eight or nine feet; in the free state, their breadth is very small at first, gradually increases, and just before vanishing attains an amplitude of nearly an inch. The capillary waves are among the phenomena we most frequently observe. It is in generating them that a gentle breeze forming over the surface of a smooth lake destroys the translucent and reflective power of the surface; they are also to be observed in all cases of primary and secondary wave motion, when the superficial film is by any cause compressed, so as to produce corrugation, and they always disappear in about twelve seconds after the exciting cause is removed. The second order of waves had also been made the subject of careful observation. A mode had been discovered of generating these waves in large groups, so that instead of observing single waves, the length of one could be deduced from the measured length of a number, thus getting the advantage of repetition of the quantity

observed. It had thus been finally determined, that these oscillating waves follow Newton's law in so far that the velocities of transmission are as the square roots of the amplitudes; but the absolute velocity differs from that of Newton, so that, instead of having the wave whose period is a second of an amplitude = 3.26, it is found to be = 3.57. The velocities determined are as follows:—

Velocity of transmission of Wave.	Amplitude.
Feet per second.	Feet.
3.01	2.65
3.16	2.94
3.29	3.125
3.37	3.26
3.57	3.57
3.72	3.913
3.84	4.20
4.16	5.00
4.62	6.25

He had also completed some further examinations of the wave of the first order, and could now present the subject in a tolerably complete form.

Prof. BRASCHMANN inquired whether he was to understand Mr. Russell as saying, that the very beautiful method described by him, of finding the velocity of a stream, gave merely the velocity of the surface, or the mean velocity of the section.—Mr. RUSSELL replied, merely the velocity of the surface.—Prof. Braschmann said, that in that case it could not be made available in the present state of our knowledge for enabling us to determine the mean velocity, which was what, in practice, we required, as no known relation existed between it and superficial velocity; depending as it did for its value on the configuration of the canal, and form and magnitude of the section. There existed no branch of hydraulics in a more imperfect and unsatisfactory state than this; all the approximations at present used being very rude and uncertain in their application.—Prof. WHWELL inquired whether Mr. Russell found the depth to which the disturbing wire was inserted into the fluid to be of any consequence.—Mr. Russell replied, not the slightest; the merest contact of the wire to the fluid produced precisely the same phenomena as its deepest insertion.—Prof. Whwell inquired how the hinder part of the curve, which these capillary waves formed at slow velocities, disappeared as the velocities increased.—Mr. Russell replied, that the hinder part of the curve drew up to the exciting wire, and at length, as the lateral branches extended, it appeared as if obliterated.—Dr. SCORESBY inquired whether, as the number of waves increased with the increase of velocity, those which were most remote from the exciting wire did not diminish in height; and if so, whether they did not also increase in breadth or distance between summit and summit.—Mr. Russell replied, that to this point he had paid the earliest and most minute attention, so that he was able to assert, with the utmost confidence, that although the waves more distant from the exciting wire diminished in height, yet the wave length, or distance from summit to summit, was everywhere, at the same velocity, equal; so that in equal spaces, taken at whatever distance from the wire, the same number were always to be found, so long as the velocity remained unchanged.

## THURSDAY.

## SECTION B.—CHEMISTRY AND MINERALOGY.

President.—Dr. J. DALTON.  
Vice-Presidents.—MARQUIS OF NORTHAMPTON, Prof. T. GRAHAM, Rev. W. V. HARCOURT, Mr. M. FARADAY, Dr. C. HENRY.  
Secretaries.—Dr. LYON PLAYFAIR, Mr. R. HUNT, Mr. J. GRAHAM, Messrs. W. WEST, J. DAVIES, H. C. CAMPBELL, H. J. WATSON, P. CLARE, A. BINYON, Dr. DAUBENY, Mr. E. SOLLY, Prof. NUTTALL, Philadelphia, Gen. Sir H. ELPHINSTONE, Bart., Messrs. LEIGH, W. BLYTH, E. SCHANK, J. CROFT, P. J. GRIFFIN, Dr. GILBERT, Dr. STEPHENS, Mr. LEACH, Prof. JOHNSON, Messrs. SEIGER, BLYTH, MEYER.

The venerable President sat on the right hand of the chair, and left the active duties of the office to Prof. Graham.

Dr. Playfair read an abstract of Prof. Liebig's Report on Organic Chemistry, applied to Physiology and Pathology.

Dr. PLAYFAIR said, that Prof. Liebig had been requested, some few years ago, to apply himself to the consideration of questions in vegetable and animal physiology. The Professor's first Report had been read at the meeting of the Association at Glasgow, in the year 1840. The second he was about to bring before their notice. And in a third, the Professor intended to apply the principles of organic chemistry to diet and dietetics; and under this head would be comprised the nutritiveness of particular vegetables

in the fattening of cattle. The first part of Prof. Liebig's Report consisted of the examination of the processes employed in the nutrition and reproduction of the various parts of the animal economy. In vegetables, as well as in animals, we recognize the existence of a force in a state of rest. It is the primary cause of growth or increase in mass of the body, in which it resides. By the action of external influences, such as by pressure of air and moisture, its condition of static equilibrium is disturbed; and entering into a state of motion or activity, it occupies itself in the production of forms. This force has received the appellation of *vital force*, or *vitality*. Vitality, though residing equally in the animal and vegetable kingdoms, produces its effects by widely different instruments. Plants subsist entirely upon manures belonging to inorganic nature. Atmospheric air, the source whence they derive their nutriment, is considered to be a mineral by the most distinguished mineralogists. All substances, before they can form food for plants, must be resolved into inorganic matter. But animals, on the other hand, require highly-organized atoms for nutriment. They can only subsist upon parts of an organism. They possess within them a vegetative life, as plants do, by means of which they increase in size, without consciousness on their part; but they are distinguished from vegetables, by their faculties of locomotion and sensation—faculties acting through a nervous apparatus. The true vegetative life of animals is in no way dependent upon this apparatus, for it proceeds when the means of voluntary motion and sensation are destroyed; and the most energetic volition is incapable of exerting any influence on the contractions of the heart, on the motion of the intestines, or on the processes of secretion. All parts of the animal body are produced from the fluid circulating within its organism, by virtue of vitality, which resides in every organ. A destruction of the animal body is constantly proceeding. Every motion, every manifestation of force, is the result of the transformation of the structure, or of its substance. Every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids. Every thought, every sensation, is accompanied by a change in the composition of the substance of the brain. It is to supply the waste thus produced that food is necessary. Food is either applied in the increase of the mass of a structure (that is, in nutrition), or it is applied in the replacement of a structure wasted (that is, in reproduction). The primary condition for the existence of life is the reception and assimilation of food. But there is another condition equally important—the continual absorption of oxygen from the atmosphere. All vital activity results from the mutual action of the oxygen of the atmosphere and the elements of the food. All changes in matter proceeding in the body are essentially chemical, although they are not unfrequently increased or diminished in intensity by the vital force. The influence of poisons and remedial agents on the animal economy proves, that the chemical combinations and decompositions proceeding therein, and which manifest themselves in the phenomena of vitality, may be influenced by bodies having a well-defined chemical action. Vitality is the ruling agent by which the chemical powers are made to subserve its purposes; but the acting forces are chemical. It is from this view, and no other, that we ought to view vitality. According to Lavoisier, an adult man takes into his system, every year, 837 lb. of oxygen, and yet he does not increase in weight. What, then, becomes of the enormous quantity of oxygen introduced in the course of the year into the human system? The carbon and hydrogen of certain parts of the body have entered into combination with the oxygen introduced through the lungs and through the skin, and have been given out in the form of carbonic acid, and the vapour of water. At every moment, with every expiration, parts of the body are thus removed, and are emitted into the atmosphere. No part of the oxygen inspired is again expired as such. Now it is found that an adult inspires 324 oz. of oxygen daily. This will convert the carbon of 24 lb. of blood into carbonic acid. He must, therefore, take as much nutriment as will supply this daily loss; and, in fact, it is found that he does so; for the average amount of carbon in the daily food of an adult man, taking moderate exercise, is 14 oz., which require 37 oz. of oxygen for their conversion into carbonic acid. But it is obvious,

as the inspired oxygen can be removed only by its conversion into carbonic acid and water, that the amount of food necessary for the support of the animal body, must be in direct ratio to the quantity of oxygen taken into the system. Thus, a child, in whom the organs of respiration are naturally in a state of great activity, requires food more frequently, and in greater proportions to its bulk, than an adult, and is also less patient of hunger. A bird, deprived of food, dies on the third day; whilst a serpent, which inspires a mere trace of oxygen, can live without food for three months. The capacity of the chest in an animal, is a constant quantity. We, therefore, inspire the same volume of air, whether at the pole or the equator. But the weight of the air, and consequently of the oxygen, varies with the temperature. Thus, an adult man takes into the system daily 46,000 cubic inches of oxygen, which, if the temperature be 77°, weigh 32½ oz.; but, when the temperature sinks down to the freezing point (32°), it will weigh 35 oz. Thus, an adult in our climate in winter may inhale 35 oz. of oxygen; in Sicily he would inspire only 28½ oz.; and, if in Sweden, 36 oz. Hence, we require more carbon in cold weather, when the barometer is high, than we do in warm weather; and we must consume more or less carbon in our food in the same proportion. In our own climate, the difference between summer and winter in the carbon expired, and therefore necessary for food, is as much as an eighth. Even when we consume equal weights of food, an infinitely wise Creator has so adjusted it as to meet the exigencies of climate. Thus, the fruit on which the inhabitants of the south delight to feed, contains only 12 per cent. of carbon, whilst the bacon and train oil enjoyed by the inhabitants of the Arctic regions, contain from 66 to 80 per cent. of the same element. Now the mutual action between the elements of food and the oxygen of the air, is the source of animal heat. All living creatures, whose existence depends on the absorption of oxygen, possess within themselves a source of heat, independent of the medium in which they exist. This heat, in Professor Liebig's opinion, is wholly due to the combustion of the carbon and hydrogen contained in the food which they consume. Animal heat exists only in those parts of the body through which arterial blood (and with it oxygen in solution) circulates. The carbon and hydrogen of food, in being converted by oxygen into carbonic acid and water, must give out as much heat as if they were burned in the open air. The only difference is, that this heat is spread over unequal spaces of time; but the actual amount is always the same. The temperature of the human body is the same in the torrid as in the frigid zone. But, as the body may be considered in the light of a heated vessel, which cools with an accelerated rapidity the colder the surrounding medium, it is obvious that the fuel necessary to retain its heat must vary in different climates. Thus, less heat is necessary in Palermo, where the temperature of the air is that of the human body, than in the Polar regions, where it is about 90° lower. In the animal body, the food is the fuel; and, by a proper supply of oxygen, we obtain the food given out during its combustion in winter. When we take exercise in a cold atmosphere, we require a greater amount of oxygen, which implies a more abundant supply of carbon in the food; and, by taking this food, we form the most efficient protection against the cold. A starving man is soon frozen to death; and every one knows that the animals of prey of the Arctic regions are far more voracious than those of the torrid zone. Our clothing is merely an equivalent for food; and the more warmly we are clothed, the less food we require. Were we to go destitute of clothes, like certain savage tribes,—or if, in hunting or fishing, we were exposed to the same degree of cold as the Samoyedes,—we could with ease consume 10 lb. of flesh, and, perhaps, a dozen tallow candles into the bargain, as warmly clad travellers have related, with astonishment, of those people. Then could we take the same quantity of brandy or blubber of fish, without bad effects, and learn to appreciate the delicacy of train oil. We thus perceive an explanation of the apparently anomalous habits of different nations. The maccaroni of the Italian, and the train oil of the Greenlanders and the Russian, are not adventitious freaks of taste, but necessary articles fitted to administer to their comfort in the climates in which they

have been born. The colder the region, the more combustible must the food be. The Englishman in Jamaica perceives with regret the disappearance of his appetite, which, in England, had been a constant recurring source of enjoyment. By the use of aromatics, he creates an artificial appetite, and eats as much food as he did at home. But he thus unfits himself for the climate in which he is placed; for sufficient oxygen does not enter his system to combine with the carbon consumed; and the heat of the climate prevents him taking exercise to increase the number of his respirations. The carbon of the food is therefore forced into other channels, and disease results. England, on the other hand, sends her dyspeptic patients to southern climates. In our own land their impaired digestive organs are unable to fit the food for that state in which it best unites with the oxygen of the air, which therefore acts on the organs of respiration themselves, thus producing pulmonary complaints. But when they are removed to warmer climates, they absorb less oxygen, and take less food; and the diseased organs of digestion have sufficient power to place the diminished amount of food in equilibrium with the respired oxygen. Just as we would expect from these views, in our own climate, hepatic diseases, or diseases arising from excess of carbon, are more prevalent in summer, and in winter pulmonary diseases, or those arising from an excess of oxygen. The Professor then went on to disprove the notion, that animal heat is due to nervous influence, and not to combustion—an error which had its origin in supposing that the combustion proceeds in the blood itself. He also showed, that animal heat must not be ascribed to the contraction of the muscles. The Professor proceeds to prove, that the heat evolved by the combustion of carbon in the body is sufficient to account for the phenomena of animal heat. He shows that the 14 ounces of carbon which are daily converted into carbonic acid, in an adult, disengage no less than 197,477° of heat; a quantity which would convert 24 lb. of water, at the temperature of the body, into vapour. And if we assume that the quantity of water vaporized through the skin and lungs amounts to 3 lb., then we have still 146,380° of heat to sustain the temperature of the body. And when we take into calculation the heat evolved by the hydrogen of the food, and the small specific heat possessed by the organs generally, no doubt could be entertained that the heat evolved in the process of combustion, to which the food is subjected in the body, is amply sufficient to explain the constant temperature of the body. From what has preceded, it is obvious that the amount of carbon consumed in food ought to depend on the climate, density of air, and occupation of the individual. A man will require less carbon when pursuing a sedentary occupation than when he is engaged in active exercise. Prof. Liebig, having thus discussed the source of animal heat, proceeds next to consider what are the ingredients in the food, which may properly be considered to be nutritious. Physiologists conceive that the various organs in the body have originally been formed from blood. If this be admitted, it is obvious that those substances only can be considered as nutritious which are susceptible of being transformed into blood. The Professor then entered upon an examination of the composition of blood, and of the identity in chemical constitution of fibrine and albumen. The nutritive process is simplest in the case of the carnivora. This class of animals live on the blood and flesh of the gaminivora, whose blood and flesh is identical with their own. In a chemical sense, therefore, a carnivorous animal, in taking food, feeds upon itself: for the nutriment is identical in composition with its own tissues. The Professor then inquired what from constituents of vegetables the blood of the gaminivorous animals is produced. The nitrogenized compounds of vegetables forming the food of gaminivorous animals are called vegetable fibrine, vegetable albumen, and vegetable caseine. Now, analysis has led to the interesting result, that they are exactly of the same composition in 100 parts; and, what is still more extraordinary, they are absolutely identical with the chief constituents of the blood—animal fibrine and animal albumen. By identity, be it remarked, we do not imply similarity, but absolute identity, even as far as their inorganic constituents are concerned. These considerations showed the beautiful simplicity of nutrition. In

point of fact, vegetables produce, in their inorganic, the blood of all animals. Animal and vegetable life are therefore most closely connected. The Professor has still to account for the use of the substances in food which are absolutely destitute of nitrogen; but which we know are absolutely necessary to animal life. In all these we find a great excess of carbon, and but very little oxygen. By a train of admirable reasoning, the Professor arrives at the interesting conclusion, that they are solely exhausted in the production of animal heat, being converted by the oxygen of the air into carbonic acid and water. This portion of the report contained an ingenious and important view of the use of bile in the animal economy, the truth of which quantitative physiology dare not deny. When exercise is denied to gaminivorous and omnivorous animals, this is tantamount to a deficient supply of oxygen. The carbon of the food not meeting with sufficient oxygen to consume it, it passes into the compounds containing a large excess of carbon and deficiency of oxygen; or, in other words, fat is produced. Liebig concludes, that fat is altogether an abnormal and unnatural production, arising from the adaptation of nature to circumstances, and not of circumstances to nature—altogether arising from a disproportion of carbon in the food to that of the oxygen respired by the lungs, or absorbed by the skin. Wild animals in a state of nature do not contain fat. The Bedouin, or Arab of the Desert, who shows with pride his lean, muscular, sinewy limbs, is altogether free from fat. And the Professor points out the diseases arising from this cause. From all that has transpired, we may sum up the nutritious elements of food as follows. The ingredients adapted for the formation of the blood, and which the Professor calls the plastic elements of nutrition, are as follows:—Vegetable fibrine, vegetable albumen, vegetable caseine, animal flesh, animal blood. The other ingredients of food being fitted to retain the temperature of the body, he calls the elements of respiration. They are—fat, starch, gum, cane sugar, grape sugar, sugar of milk, pectine, bassorine, beer, wine, spirits. These are Prof. Liebig's general principles of nutrition. The second part of the work consists of details, in which he examines the chemical processes engaged in the production of bile, of urea, uric acid and its compounds, as well as of cerebral and nervous substance. The conclusions to which he has arrived on these subjects are of such great and startling interest, that Dr. Playfair said, he dared not venture to make an abstract of them, without entering into the calculations with which they were accompanied. In the Professor's explanatory remarks on digestion, he ascribes a singular function to saliva. This fluid possesses the remarkable property of enclosing air in the shape of froth, in a far higher degree even than soap suds. This air, by means of the saliva, accompanies the food into the stomach, and there its oxygen enters into combination with the constituents of the food, whilst its nitrogen is again given out through the lungs or skin. The longer digestion continues, the greater is the quantity of saliva, and consequently of air, which enters the stomach. Rumination, in certain gaminivorous animals, has plainly for one object a renewed and repeated introduction of oxygen. The Professor further touches upon the use of tea and coffee as an article of food. Recent chemical research has proved, that the active principles of tea and coffee—viz. teine and caffeine—are absolutely one and the same body, perfectly identical in every respect. The action of tea and coffee on the system must be therefore the same. How is it that the practice of taking them has become necessary to whole nations? Caffeine (teine) is a highly nitrogenized body. Bile, as is well known, contains an essential nitrogenized ingredient—taurine. Now, Prof. Liebig considers, that caffeine goes to the production of this taurine; and if an infusion of tea contains only one-tenth of a grain of caffeine, still if it contribute, in point of fact, to the formation of bile, the action even of such a quantity cannot be looked upon as a nullity. Neither can it be denied, that, in case of using an excess of non-nitrogenized food, or deficiency of motion, which is required to cause the change of matter in the tissues, and thus to yield nitrogenized matter of the bile, that in such a condition the state of health may be benefited by the use of tea or coffee, by which may be furnished the nitrogenized product produced in the healthy



state of the body, and essential to the production of an important element of respiration. The American Indian, with his present habits of living solely on flesh, could not with any comfort use tea as an article of food; for his tissues waste with such rapidity that, on the contrary, he has to take something to retard this waste. And it is worthy of remark, that he has discovered in tobacco smoke a means of retarding the change of matter in the tissues of his body, and thereby of making hunger more endurable. Nor can he withstand the captivation of brandy, which, acting as an element of respiration, puts a stop to the change of matter, by performing the function which properly belongs to the products of the metamorphosed tissues. The third part of Prof. Liebig's Report treats of the recondite laws of the phenomena of motion. As it is principally of a speculative character, we can pass this over. The Professor concludes his communication by two chapters: one on the theory of disease; the other on the theory of respiration. The whole life of animals consists of a conflict between chemical forces and the vital powers. In the normal state of the body of an adult, both stand in equilibrium. Every mechanical or chemical agency which disturbs the restoration of this equilibrium is a cause of disease. Disease occurs when the resistance offered by the vital force is weaker than the acting cause of disturbance. Death is that condition in which chemical or mechanical powers gain the ascendancy, and all resistance on the part of the vital force ceases. Every abnormal condition of supply or waste may be called disease. It is evident that one and the same cause of disease, *i.e.* that of disturbance, will have different effects, according to the period of life. A cause of disease, added to the cause of waste, may in old age annihilate the resistance of the vital powers, or, in other words, occasion death; while, in the adult state, it may produce only a disproportion between supply and waste; and in infancy only an abstract state of health, *i.e.* an equilibrium between supply and waste. Prof. Liebig argues, from what has preceded, that a deficiency of resistance in a living part to the cause of waste is in fact a deficiency of resistance to the action of the oxygen of the atmosphere. The professor's theory may be compared to a self-regulating steam-engine. The body, in regard to the production of heat and of force, acts just like one of those machines. With the lowering of the external temperature, the respiration becomes deeper and more frequent; oxygen is supplied in greater quantity, and of greater density; the change of matter is increased, and more food must be supplied, if the temperature of the body is to remain unchanged. It has been proved, that iron is not necessary to the colouring matter of the blood, but that it forms an essential constituent of blood globules. These globules, it is well known, take no part in nutrition. Prof. Liebig conceives, that the iron is the great means of conveying to the tissues the carbonic acid formed in the system; and he has made a calculation, that the iron contained in the body could actually convey twice as much carbonic acid as is expelled daily from the system.

Mr. SOLLY read a paper by Prof. Schönbein, 'On the Electrolyzing Power of a Simple Voltaic Circle.' The effect of various experiments made by the learned author were to establish the fact, that voltaic effects may be produced without the solution of a metal, the usual source of voltaic actions, but by nitric and various other acids.

Mr. WILLIAM BLYTH read a paper 'On the Manufacture of Sulphuric Acid.'—The ordinary process of manufacturing sulphuric acid, by introducing into a leaden chamber a mixture of sulphurous acid, red nitrous fumes, and common air, has been long practiced. Like many other improvements in the arts, it seems to have been more the result of chance than the application of scientific skill; and chemists remained long in the dark as to the true nature of the changes which took place in the vitriol chamber. The first satisfactory explanation was given to the world by Clement and Desormes, in 1806. These chemists discovered the white crystalline compound which is now known to be formed when sulphurous acid, red nitrous fumes, common air, and the vapour of water, are mixed together, and exposed to a sufficiently low temperature. They also observed the remarkable property which it possesses of being decomposed when put into water, and of being resolved

into nitric oxide and sulphuric acid. This fact they applied to explain the important part performed by the nitric oxide, in enabling the sulphurous acid to be still farther oxydized at the expense of the oxygen in the common air. The formation of the crystalline compound in the leaden chamber, its decomposition by the weak acid at the bottom of the chamber, and the evolution of nitric oxide to be again changed into red nitrous fumes by the oxygen of the common air,—is the favourite theory of chemists at the present time, and seems to be now generally admitted. M. Adolph Rose, of Berlin, has recently published a paper on the 'Combination of Hydrated Sulphuric Acid with Nitric Oxide.' The object of the paper is to show that the impurity in the sulphuric acid of this country, which has hitherto been considered to be nitric acid, is not nitric acid, but a combination of sulphuric acid and nitric oxide. He also shows, that this compound of sulphuric acid and nitric oxide is identical with the white crystalline formed in the vitriol chamber. There are some facts mentioned in this important paper which deserve attention; and it is more particularly the object of these remarks to bring them under the notice of those members of the Association who may be interested in the manufacture of this important acid. It is well known, that, in the making of sulphuric acid, when the acid in the chamber reaches the specific gravity of 1.450, it is impossible to go beyond this point without increasing the proportion of nitre; and even with an increased proportion of nitre, the product of acid is less than it ought to be. The reason is, that sulphuric acid, of the specific gravity of 1.450, acts very slowly in decomposing the white compound; and acid of the specific gravity of 1.500 will not act upon it at all, but, on the contrary, it has a tendency to dissolve and retain it.—Mr. Blyth demonstrated these facts by experiments.—M. Adolph Rose states, that when sulphuric acid, containing the compound, is concentrated by distillation, at one part of the process pure acid comes over; and when the acid in the retort has reached the specific gravity of 1.84, it will be found, if examined, to contain nitric oxide. It follows from this, that, when sulphuric acid is raised in the chamber above the specific gravity of 1.500, it will be found, after being rectified, more or less contaminated with the nitrous compound. He made a number of trials, to ascertain the effect of the nitrous compound upon indigo. Some of the compound was dissolved, by the aid of heat, in sulphuric acid of specific gravity 1.600. To this solution he added some drops of a strong solution of indigo in pure rectified sulphuric acid. The blue colour of the indigo was immediately destroyed. M. Adolph Rose also states, that, if rectified sulphuric acid, which is contaminated either with nitric acid or nitric oxide, be diluted with twice its bulk of water, and concentrated by distillation till it reaches the specific gravity of 1.84, the concentrated acid will be found to have been freed from both of these compounds. It follows, from this experiment, that, in order to obtain sulphuric acid sufficiently pure to be used in the preparation of sulphate of indigo, it would only be necessary to draw the acid from the chamber at a low specific gravity, not higher perhaps than 1.300 or 1.350. Rectified sulphuric acid, prepared from acid drawn from the chambers at the above strength, if found to be perfectly free from all nitrogeous compounds, will be a great acquisition to the woollen dyer in the preparation of his sulphate of indigo; and when we consider the large quantities of acid used for this purpose, it will be admitted to be a subject of great importance.

#### SECTION C.—GEOLOGY AND PHYSICAL GEOGRAPHY.

President.—Mr. R. L. MURCHISON.  
Vice-Presidents.—Sir H. T. DE LA BECHE, Rev. W. BUCKLAND,  
Rev. A. SEDGWICK, Mr. R. GRIFFITH.  
Secretaries.—Mr. H. E. STRICKLAND, G. LLOYD, M.D.,  
Messrs. E. W. BISSLEY, R. HUTTON.

Committee.—Prof. Owen, Mr. J. Phillips, The Earl of Enniskillen, Mr. Ermau, Count A. Von Keyserling, Dr. Dieffenbach, Mr. Schoolcraft, (U.S.), Mr. J. F. Bateman, Dr. Black, Messrs. G. W. Ormerod, J. Taylor, W. C. Williamson, W. Gray, Jun., Rev. T. Egerton, Messrs. J. Hawkahaw, J. Bryce, H. C. Campbell, E. Hall, M. Daves, Rev. D. Williams, Mr. L. B. Hutton, Marquis of Northampton, Rev. W. Worsell, Mr. W. F. Alcock.

1. 'On the Physical Structure of the Appalachian Chain, as exemplifying the laws which have regulated the elevation of great Mountain Chains generally,' by Professors H. D. Rogers, and W. B. Rogers.

The Appalachian Chain of North America is described by the authors as consisting of a series of very

numerous parallel ridges or anticlinal lines, forming a mountain belt generally 100 miles in breadth and nearly 1200 miles in length, stretching from the South-eastern angle of Lower Canada to Northern Alabama. 1. The strata which compose this chain are the American representatives of the Silurian, Devonian, and Carboniferous systems of Europe, united into one group of conformable deposits. The general direction of the chain being N.E. and S.W., there is a remarkable predominance of S.E. dips throughout its entire length, especially in the south-eastern or most disturbed side of the belt. Proceeding north-westwards or away from the quarter of greatest disturbance, N.W. dips begin to appear; at first few and very steep, afterwards frequent and gradually less inclined. 2. The authors consider the frequency of dips to the S.E. or towards the region of intrusive rocks, accounted for by the nature of the flexures, which are not symmetric, the strata being more inclined on the N.W. than on the S.E. of each anticlinal, amounting at length to a complete folding under and inversion, especially on the S.E. side of the chain, where the contortions are so closely packed as to present a uniform dip to the S.E. These folds gradually open out, the N.W. side or inverted portion of each flexure becomes vertical, or dips abruptly to the N.W.; proceeding further in this direction the dips gradually lessen, the anticlinals and troughs becoming rounder and flatter, and the intervals between the axes constantly increasing till they entirely subside at about 150 miles from the region of gneiss and intrusive rocks. The authors express their belief that a similar obliquity of the anticlinal axes will be found to obtain in all great mountain chains, their planes always dipping towards the region of chief disturbance. The inverted flexures are regarded by the authors as exhibiting simply a higher development of the same general conditions. The passage of inverted flexure into faults is stated to occur frequently, and invariably along the N.W. side of the anticlinal or S.E. of the synclinal axes; these dislocations, like the axes, maintain a remarkable parallelism. 3. The axes of the Appalachian chain are distributed in natural groups, the members of each group agreeing approximately in length, curvature, amount of flexure, and distance apart. Nine principal groups are described, in five of which the axes are straight, whilst the four which alternate with them are curved; in two of the curved divisions the line of strike is convex to the N.W., in the other two it is convex to the S.E. In every part of the chain the axes, whether curved or straight, maintain an approximate parallelism to those of their own division, and in the minor groups within the large divisions the parallelism is still more exact. The axes vary in length from insignificant flexures to lines frequently 100 and sometimes 150 miles in length, and they deviate very little from a rectilinear course, or, as the case may be, from a uniform rate of curvature. Some of the longer curved axes exhibit a difference of strike at their extremities of 50 in a distance of 90 miles, and the rectilinear axes of different divisions vary in their line of direction as much as 60°. As all the flexures were undoubtedly formed at one period, the authors consider these facts at variance with M. Beaumont's hypothesis, that dislocations of the same geological age are parallel to one and the same meridian. 4. The general declension in level of the Appalachian strata towards the N.W., or away from the quarter of greatest local disturbance, is considered important by the authors in its bearing upon the subject of the elevation of broad continental tracts. The authors next proceed to notice memoirs, describing what they consider similar phenomena in Europe.

*Theory of Flexure and Elevation of Strata.*—From the consideration of the preceding general facts the authors have arrived at a theory which they conceive applicable to the bending and elevation of strata generally. They state that the oblique form of all normal anticlinal and synclinal flexures "indicates that the force producing the dips was compounded of a wave-like oscillation and a tangential pressure;"—a purely vertical force exerted simultaneously or successively along parallel lines could only produce a series of symmetrical flexures, whilst tangential pressure, unaccompanied by a vertical force, would result in irregular contortions dependent on local irregularities in the amount of resistance. The alternate upward and downward movements necessary to

enable the tangential force to bend the strata into a series of flexures, are such "as would arise from a succession of actual waves rolling in a given direction beneath the earth's crust." The authors observe that it would be difficult to account for the formation of grand yet simple flexures, by a repetition of feeble tangential movements, or by "a merely upward pressure, unaccompanied with pulsations on the surface of a fluid; and if this force be feeble and oft repeated, it is difficult to understand how it could return always to the same lines until they became conspicuous flexures." The authors suppose the strata of the region in question to have been subjected to excessive upward tension arising from the expansion of molten matter and gaseous vapours; the tension would at length be relieved by many parallel fissures formed in succession, through which much elastic vapour would escape, and, by thus removing the pressure adjacent to the lines of fracture, produce violent pulsations on the surface of the fluid below. This oscillatory movement would communicate a series of temporary flexures to the overlying crust, which would be rendered permanent by the intrusion of molten matter into the fractured strata originating the tangential force by which the flexures received their peculiar character before described. The authors do not deem it essential to this explanation that, in the production of axes of elevation, the strata should be permanently fractured to the surface. Fissures sufficient for the escape of vast bodies of elastic vapour, might open and close again superficially; and the strata may often be supported in their new position by subterranean injections not visible on the surface.

*Identity of the Undulations which produced the Axes, with the wave-like motion of the Earth in Earthquakes.*—The authors suppose all earthquakes to consist in oscillations of the earth's crust propagated with extreme rapidity; and they ascribe this movement to a sudden change of vertical pressure on the surface of an interior fluid mass, throwing it into wave-like undulations, such as would produce permanent flexures in the strata if more energetic, accompanied by the formation of dykes. The successive earthquakes of any region usually proceed from the same quarter, and this must also have been the case with the movements which gave rise to the parallelism of contiguous anticlinal lines. In illustration of the power of producing permanent lines of elevation which earthquakes have exhibited in modern times, the authors instance the Ullah Bund, an elevated mound extending 50 miles across the eastern arm of the Indus, which was the result of the great earthquake of Cutch in 1819; and another case recorded in 'Darwin's Journal of Travels in South America,' which a traveller described as a line of elevation of the strata, crossing a small rivulet, and shown in the fact that he found himself going down hill while ascending the dry deserted channel.

*Date of the Appalachian Axes.*—The authors describe the elevation of this chain as simultaneous with the termination of the carboniferous deposits of the United States, and as the cause which probably arrested the further progress of the coal formation. With one local exception, on the Hudson, the whole series seems to have been deposited conformably, without any emergence of the land. That the elevation did not take place later, is shown by the undisturbed condition of the overlying beds, approximately of the age of the European new red sandstone. The elevation of the chief part of the great belt of metamorphic rocks on the S.E. side of the chain is referred to the same great movement. In conclusion, the authors remark that an incomparably greater change in the physical geography of North America, and perhaps of the globe, seems to have occurred at the close of the Carboniferous epoch than at any previous or subsequent period; and they consider these changes, and the effect produced by them on the organic world, as affording some of the highest subjects of geological investigation.

Mr. MURCISON confirmed the views given by the authors of the paper, of the great break in the series of geological deposits which occurs between the Paleozoic rocks and later deposits; the coincidence in the direction of some great chains in Europe and America, belonging to the same geological period, was very striking. He was not prepared to give any opinion upon Prof. Rogers's undulatory theory.—Sir H. T. DE LA BECHE described the general character of

anticlinal and synclinal lines, and stated, that whilst contortions of the strata sometimes assumed the character of mountain chains, at other times they occupied large tracts of low ground, as in the comparatively flat country of South Wales. He then made some observations on the space occupied by masses of rock over certain areas; the older rocks of England, if flattened, would occupy a much greater space than at present; and the area of the Alps and Jura would be greatly extended if all their contortions were spread out. The phenomena described in the Appalachian chain, so far as small differences in the direction of the anticlinals were concerned, did not at all affect the brilliant theory proposed by M. Elie de Beaumont; the object of the geologist was to trace the correspondence in the direction of the great lines of elevation, and in this broad view the N.E. and S.W. direction of great part of the European rocks agreed remarkably with the direction of the Appalachian chain. He did not consider the pulsation of molten matter, as described by the authors of the paper, necessary to account for the flexures so very numerous in the strata of mountainous districts, but not confined to them, and in many instances unaccompanied by the intrusion of igneous rocks. The only force necessary for the production of such flexures and contortions was, the tangential or lateral pressure, in order to compress the strata into a smaller space. Contortions were formerly accounted for by a supposed secular diminution in the volume of the earth; the crust was compelled to accommodate itself to the diminished surface arising from the contraction of the mass. But it was to be remembered, that these contortions were not common to all the world: in Russia, the strata presented one even bend over a wide area. Our knowledge of America, and much of the rest of the world, was imperfect; and until we were much better acquainted with the distribution and character of contorted strata all over the globe, we should not be able to account very rationally for the figures they assumed.—Mr. SEDGWICK pointed out those circumstances in the structure of the Appalachian chain which accorded with previous observations in Europe; the persistency of the strike of the strata, the parallelism of the anticlinal and synclinal lines, and the diminution in the amount of disturbance as the strata recede from the district where the greatest force was applied. He did not allow that the circumstance of curvilinear elevations was opposed to the theory of M. Beaumont, who had himself described curved elevations quite as striking. Most of the instances adduced by Prof. Rogers, in illustration of his view of the average inclination of the strata being greater on the side of each flexure *farthest* from the centre of the disturbing forces, did not, in his opinion, confirm the view the authors had taken of the origin of those contortions. Again, Mr. Sedgwick stated, the position of the successive strata in the British chains, was not generally such as that which characterized the chain so carefully described by the authors of the paper. The effects of disturbing forces, such as the intrusion of igneous rocks, was chiefly dependant on the nature of the rocks affected. In Cumberland the porphyritic rocks, which were evidently molten when introduced, had become hard by cooling, and had been fractured and dislocated along with the rocks among which they were intruded; but from the very nature of those rocks, they could not be thrown into many undulations. In North Wales, where the conditions differed, and the igneous rocks were less abundant, the alternating beds of solid porphyry and softer rocks were thrown into a series of anticlinal and synclinal lines; whilst in the Liège country the beds, when in a very soft and plastic state, had evidently been subjected to great lateral pressure, forcing them to assume enormous contortions, but never elevating them into mountains. The authors had, he thought, rather undervalued the power of tangential forces. These were well illustrated in the effects produced upon the soft slates of North Devon, by the intrusion of masses of granite many miles across, like that forming the forest of Dartmoor, between which and other granite masses, the strata were crumpled and thrown into innumerable undulations. He believed there was very little analogy between the phenomena produced by earthquakes, and those attributed to continental elevation; the oscillations of the earth's sur-

face produced by earthquakes were like those of a cord struck when subjected to tension: from the very nature of these vibrations, they might be propagated rapidly over a great part of the globe. The impulses of elevation, as far as anything was known of them, were slow, acting over wide areas, and disrupting and contorting mountain masses. Nothing was more certain than that continental masses had risen, and were rising, in our own time: Norway, for example, with curvations so slight as to be invisible. In the Southern and Pacific Ocean, Mr. Darwin had pointed out large areas, rising and subsiding, some of them 3,000 or 4,000 miles in diameter. He stated that he was not prepared to grapple with a theory which was so imperfectly explained, and without diagrams; he only wished phenomena not to be pressed into its service, which either bore not upon it at all, or were, perhaps, opposed to it; namely, the phenomena of the British chains. He lastly endeavoured to show how, in many cases, a reversed dip might be produced after the first protrusion of a central granitic axis. Prof. Sedgwick concluded with a merited compliment to the American nation for the elaborate surveys they had published, of which the present memoir was an example; the facts of which must, in the end, serve along with similar phenomena to form the base of a legitimate theory.

'Report of Committee appointed at the Meeting of the British Association, held at Plymouth in 1841, for Registering Shocks of Earthquakes in Great Britain.'

The Report commences with a list of shocks observed at Comrie, in Perthshire, since the date of that given in, last year, to the Association by the Committee. (*Athenæum*, No. 719.) Sixty distinct shocks are recorded as having occurred on thirty-six different days, between July 23rd, 1841, and June 8th, 1842. Twelve of these are registered as having occurred on the 30th of July, 1841, being the greatest number hitherto noticed in the course of a single day. The instruments employed to indicate the shocks were those described last year (*Athenæum*, No. 719.) The new instruments provided by the Committee have not (with one exception) yet been affected, having been but a short time at their respective stations; and out of the sixty shocks above mentioned, there were but three occasions on which these instruments were moved.

1. On the 26th July, 1841, the inverted pendulum set in the steeple of Comrie parish church, was thrown about half an inch to the west, apparently indicating a horizontal movement of the ground eastward, to the same amount. An upward heave of the ground, to the extent of half an inch, was also indicated by two instruments, one of them being a horizontal bar, described in the course of the Report.

2. The next shock by which the instruments were affected occurred on the 30th July, 1841. The inverted pendulum in Mr. Macfarlane's house at Comrie, vibrated to the extent of half an inch, in a direction south and north; whilst at Tomperan (about 1½ mile east of Comrie), an instrument on the principle of the common pendulum vibrated east and west. The instruments for showing vertical movements were but slightly affected. Mr. Macfarlane describes this shock as very severe, though not so violent as that of October, 1839: estimating the former at 10, the intensity of this shock may be represented by 12. The shock was distinct, and the noise and vibrations accompanying it are described as very loud and violent, both as observed within houses and in the open air. Twelve shocks are said to have been felt in the course of the day; the weather was cold and inclined to stormy, at the time of this occurrence, and for a day or two before and after. The trees in the neighbourhood of Comrie are described as much agitated. The shock was felt eastward, at least as far as Newburgh, about 32 miles from Garriehrow; westward to Delnalyth, about the same distance; as far north as Glendou, 30 miles; and southward to Alloa and Stirling, 29 or 30 miles. All the shattered chimneys noticed near Duniva, were on walls, &c. running N. and S.; those on E. and W. walls being untouched. The injured buildings stood on a gravelly soil; but the distance from rocks below was unknown. There was nothing in the weather previous to the earthquake, to give any notice of its approach: indeed, after a course of some years' observation, no exact rule in this respect has been obtained; even a period of wet weather, which was formerly thought the constant forerunner of frequent and violent shocks, is not always succeeded by them; and, on the other hand, earthquakes have occurred when the sky was clear and open. The spot from which the earthquake shocks in Perthshire appear to originate, being situated about a mile to the north of Duniva, it is not difficult to understand why walls running N. and S. were affected; and those from E. to W. untouched.—3. On the 9th Sept. 1841, another pretty severe shock was felt at Comrie, about 10' before midnight. The following morning the Association's instrument in the steeple was inclined ½ of an inch to the south; that in the Comrie House ½ an inch to the north. This disagreement in the indications may perhaps be accounted for by the occurrence of two other shocks in the course of the night, and previously to the examination of the instrument: the weather during the two preceding days was remarkably wet and close.—4. On the 6th June, of the present year, two shocks were felt at Comrie, between 1 and 2 A.M. The horizontal pendulum recently sent to Mr. Macfarlane's house, indicated an upheave of the ground to the extent of a quarter of an inch. From a review of all the details, it seems probable that the particular spot from which the earthquakes emanate, is situated about one mile

The shocks, late these are o  
plained in  
ists of four  
col, and  
on the soil  
compass;  
the mercu  
there is no  
ground onl  
affected by  
Mr. Newm  
Wheatston  
strument  
movements  
bur, fixed  
spring, an  
suddenly r  
not remain  
move any  
against it  
light subst  
the red me  
Beside th  
tometer, m  
lane, of C  
at the tim  
generally.  
The Comm  
instruments  
posess; a  
cases of c  
as there se  
seized by  
quake sho  
various ag  
have not  
shocks in  
as the prin  
experiences  
and establ

Dr. Bu  
observati  
by earth  
fault, the  
the earth  
atmosph  
affect the  
frequent  
inquiry in  
strata un  
brought  
Comrie,  
origin of  
the small  
had been  
likely to  
quakes, &  
ditions,  
blished a  
influenced  
arrive at  
spheric;  
the coin  
ticular s  
Perhaps  
than the  
greatest  
through  
this, how  
his belie  
any grea  
earthqu  
as a gene  
and Jam  
of the s  
ranges o  
whilst o  
on gran  
relations  
much al  
ings of  
destroye  
exagger  
history  
sand bas  
coral re  
accomp  
washed  
those on  
whilst lo  
of the in  
the sar



N.E. of Duniva House, and one and a half or two miles N.W. of Comrie; and it is considered desirable to place additional instruments at Duniva, and in the neighbourhood, with the view of approximating still nearer to the exact spot of emanation.

The additional instruments for indicating earthquake shocks, lately sent out, are seven in number. 1. Four of these are on the principle of the watchmaker's noddie, explained in last year's Report.—2. Another instrument contained in four horizontal glass tubes slightly turned up at each end, and filled with mercury. These tubes are laid down on the solid floor of a room, according to the points of the compass; and it is expected that when a shock takes place the mercury will flow out of one or more of these tubes. If there is no horizontal movement, but an inclination of the ground only, the mercury will flow out of the tube or tubes affected by the inclination. This instrument was made by Mr. Newman, of London, under the directions of Professor Wheatstone and Mr. D. Milne.—3. The two remaining instruments are intended exclusively to indicate vertical movements of the ground. They consist of a horizontal bar, fixed to a solid wall, by means of a strong flat watch-spring, and are loaded at the opposite end. If the wall suddenly rises or sinks, the loaded end of this horizontal rod remains from its *vis inertia* nearly at rest, and thus can move any light substance (as paper or a straw) brought against it by the vertical movement of the ground; the light substance being so adjusted as to remain fixed wherever the rod moves it.

Beside the above instruments, a barometer, a double thermometer, and a rain-gauge, have been sent to Mr. Macfarlane, of Comrie, in order that the state of the atmosphere at the time of the shocks, and the nature of the weather generally, during their occurrence, may be ascertained. The Committee, however, think it desirable to procure instruments much more sensitive than any which they yet possess; and they particularly call attention to the importance of carrying on meteorological observations at Comrie, as there seems to exist strong grounds for the opinion entertained by many, of an intimate connexion between earthquake shocks and the state of the weather, or rather the various agents which affect the weather. The Committee have not yet attempted the registration of earthquake shocks in any part of the country except Perthshire; but as the primitive districts of Cornwall and Wales have often experienced shocks, they propose also to send instruments and establish observations in those parts of the country.

Dr. BUCKLAND recommended the establishment of observations along various lines known to be affected by earthquake shocks, such as the Chichester line of fault, Scaranea, and Falmouth. The electric state of the earth would probably be found to influence the atmosphere much more powerfully than the air would affect the earth; the earthquake shocks were most frequent in the autumn and winter, and it was worth inquiry how far the rains of that period would affect strata under different electric conditions, such as those brought in contact by the faults and trap dykes of Comrie, and thus, perhaps, afford some clue to the origin of the shocks.—Mr. SEDGWICK believed that the small amount of evidence as to movement, which had been or could be obtained in Britain, was not likely to throw much light on the origin of earthquakes, or on their connexion with atmospheric conditions. When regular observations could be established abroad, in regions frequently and powerfully influenced by such movements, we might hope to arrive at the conditions of their occurrence. Atmospheric conditions ought certainly to be noticed, and the coincidence of the shocks in Scotland with particular seasons of the year, well deserve remark. Perhaps the phenomenon was not more remarkable than the fact, that meteors showed themselves in greatest abundance during the passage of the earth through particular portions of its orbit. In saying this, however, Mr. Sedgwick did not mean to express his belief that atmospheric conditions could have any great effect on the deep-seated phenomena of earthquakes.—Sir W. T. DE LA BECHE stated, that as a general rule the earthquakes of South America and Jamaica were felt most severely along the strike of the strata; in some instances, houses built on ranges of solid rock were affected by the shocks, whilst others only a quarter of a mile distant, built on gravel, entirely escaped. In all the published relations of the effects produced by earthquakes, much allowance was to be made for the excited feelings of the spectator. Thus the earthquakes which destroyed Port Royal had been described in all the exaggerated language inspired by terror; the real history was very simple; the town was built on a mud bank, encircling a number of small detached coral reefs; the violence of the waves, aided and accompanied by the concussion of the earthquake, washed away all this sand, and with it the houses, those on the coral reefs remaining as strong as before, whilst loose masses of stone, amongst the craggy rocks of the interior, naturally fell down from the effect of the same vibration.—Mr. NICHOLSON, of Kendal,

described a slight earthquake, which had occurred on the 13th of the present month, on the shores at Morecambe Bay. The shock, which was sudden and violent, took place at 2 A.M.; there had been six weeks of drought previously, and on the day before the shock the thermometer stood at 94° in the shade, being 9° higher than it had risen in that neighbourhood since the year 1826. At 2 P.M., of the same day, the rain set in heavily. This earthquake was felt for ten miles round Kendal.

‘On the Structure and Mode of Formation of Glaciers,’ by James Stark, M.D.—The author stated that he employed the word glacier to signify the entire ice masses which filled the upper as well as lower valleys of snow-covered mountains, and extended downwards to the cultivated valleys or sea shore. He was induced to overlook the artificial division of these masses into *Firn*, *Mer de Glace*, &c. believing such divisions did not exist in nature, and were inapplicable to the glaciers of the Polar regions. From an examination of the accounts given by Saussure, Auldjo, Desor, and others, Dr. Stark was of opinion that there existed no constant differences in the crystalline structure of the ice in different parts of glaciers; perfect glacier ice, both as to purity and compactness, occurred at all heights; from which he inferred, that after the crystalline particles of snow became once consolidated into compact ice, no further change, or enlargement of those particles, occurred till the mass was finally dissolved. The ice of glaciers had always been described as arranged in regular layers, but their position and mode of formation, as explained even by the latest writers, was stated by Dr. Stark to be so obscure, that having carefully examined the facts, he had formed conclusions, of which, as they differed from those usually entertained, he proceeded to give a summary, classifying the differences observable in the structure of glacial masses under the following divisions:—1. *Horizontal strata*. The author remarked that this was usually termed *banded structure*, and seemed to be confined to the upper regions of the mountains. The planes invariably coincided with the surface of the glacier, the layers being usually 1 to 3 feet in thickness. They were mentioned by almost all writers on glaciers, and represented in the plates of M. Agassiz's work. Most writers considered them as marking the annual additions to the glacier; but as the amount of snow falling on the average during the six winter months would produce a much greater thickness of ice than the horizontal layers indicated, Dr. Stark considered that each band denoted a separate fall of snow, unless it should appear that snow and ice wasted with nearly as much rapidity in the upper as in the lower regions.—2. *Longitudinal and vertical strata*. Dr. Stark stated that this structure had been described by Gruner in 1760, by Desmarest in 1779, Scoresby in 1824, and other authors, and during the last winter had been claimed as a new discovery by Prof. Forbes, who styled it ribboned or banded structure. These layers he described as always of great tenuity, forming planes more or less vertical, but always parallel with the length of the glacier or its retaining walls. The explanation of this structure offered by Dr. Stark is as follows:—During the spring and summer months it is probable that glaciers advance from 1½ to 3 feet daily, and as the valleys occupied by them generally widen as they recede from the higher regions, every movement would leave a space between them and their containing walls; these fissures would continually fill up with fresh snow and ice, increasing the breadth of the glaciers, and forming a new series of vertical planes. The frequent occurrence of mud, gravel, and fragments of rock in the same planes, was considered by Dr. Stark to be much in favour of this explanation of their origin. This structure, he remarked, was likely to be found wherever pillars and needles of ice were met with, since fissures and crevices generally divided glaciers transversely; and in passing over rough ground, the unequal pressure on a combination of transverse fissures and longitudinal lamellæ would break up the ice into vertical prismatic columns.—3. *Horizontal combined with longitudinal and vertical strata*. Although no such combination as this had hitherto been described, Dr. Stark thought it must exist. Horizontally stratified ice was confined to elevated regions, where the thickness of glaciers was three or four times greater than in lower valleys. Dr. Stark inferred that these

beds gradually wasted away as the glacier descended until only the lower, or vertically stratified, portion remained.—4. *Inclined strata*. This structure Dr. Stark endeavoured to explain as one superinduced, after the accidental destruction of the lines of stratification which formerly existed. In conclusion, Dr. Stark observed, that all the above forms of stratification might be expected to occur in the extent of a single glacier.

Dr. RICHARDSON observed, that snow constantly disappeared in great quantities without melting; in dry frosty air, with a temperature below zero, it would disappear rapidly by insensible evaporation. The prismatic form of ice, which occurs on lakes where it has attained a thickness of six or eight feet, takes place only in the spring when it begins to melt; the particles were considered to undergo a new arrangement when the temperature of the mass was elevated to the melting point.—Col. SABINE had seen the ribboned structure of glacial ice mentioned by Prof. Forbes, but doubted whether it had ever been seen in polar ice; he had never met with it, and did not think it would have escaped his observation.

#### SECTION D.—ZOOLOGY AND BOTANY.

*President*—The Hon. and Very Rev. Wm. HERBERT, LL.D.  
*Vice-President*—J. RICHARDSON, M.D., Mr. J. MOORE,  
Sir W. JARVIS, Bart., The Bishop of Norwich.  
*Secretaries*—E. LANKASTER, M.D., Messrs. R. PATTERSON,  
J. A. TURNER.  
*Consulters*—Prof. Royle, Messrs. G. T. FOX, H. E. STRICKLAND, Prof. Owen, Mr. J. Blackwall, Capt. Brown, Prof. Daubeny, Messrs. J. E. Gray, B. Taylor, C. C. Babbington, Rev. W. Scoresby, Count Von Keyserling, Dr. Ruger, Mr. A. Strickland, Rev. J. B. Reade, Messrs. B. Maund, E. Cluettworth, J. Alder, G. W. Hall, H. Deany.

A Report was read, ‘On the present state of the Ichthyology of New Zealand,’ by John Richardson, M.D.—The desirableness of a report on the Zoology of that country is very great, on account of its becoming so rapidly populated, and there can be but little doubt that many of the present animal inhabitants will disappear entirely, and others will be driven from their native localities. Of the mammalia, only the dog and rat have been seen, and no snakes. This report is confined to the fishes. Very little has been added to what was made known by those who accompanied Captain Cook in his first and second voyages. They figured or described upwards of sixty-three species, to which nine have been added by Cuvier and Valenciennes, and five by other writers, making in all seventy-seven. Some of these exhibit strange forms and habits. Many are strictly *littoral* progeny of the minute crustacea which deposit their spawn in such localities. The *Bolophaethon* even ascend the beach, like little lizards, to pursue their prey. The *Pleurogathi* are adapted for living in rough seas; their powers of swimming are small; some are protected with hard spines, like a hedgehog or sea urchin, and have a power of distending their skins with air or with water, according to circumstances. Marsupial animals characterize the animal kingdom of New Holland, and the same influence seems to have acted on fish to produce a character amongst them as remarkable as the kangaroo amongst mammalia. As their organization seems to fit them for districts with little water, so does that of these fishes. During the season that the water dries up, various species of *Batrachi*, *Gobiodes*, *Cyprin*, and *Apodes*, bury themselves in the mud, and like the *Lepidosiren* of the Gambia, remain in an inert state till the rain falls. The sources from whence the information in this Report was obtained, are chiefly the manuscripts of Solander, with the drawings of Forster and Parkinson, now in the British Museum. A list of the species accompanied the Report, with remarks by the reporter on the more rare and singular species.

Dr. BATEMAN hoped that something more than information got from books would be laid before the Society, so that the existing species of animals might be referred to modern systems of classification.—Mr. BABBINGTON stated, that the object of the Report was to gain what information was scattered amongst previous writers, for the purpose of assisting future investigators.

Mr. PATTERSON read the substance of two Reports—the one, results of dredging at depths varying from 50 to 145 fathoms, off the Mull of Galloway, by Captain Beechey, R.N., drawn up by W. Thompson, Esq.; the other, results of dredging off the Mull of Cantyre, by Mr. Hyndman, and off Ballygally, county Antrim, by Mr. Patterson.

Mr. BABINGTON read the Report of the Committee for the preservation of Animal and Vegetable Substances.—A large number of simple solutions of various salts had been tried, but, with the exception of the sub-carbonate of potash, they had all failed to preserve the specimens for any length of time. The specimens in solutions of this salt were in good condition. Substances in solutions of one part of naphtha to seven of water were in a state of good preservation. Kreosote is a good preservative, but it stains the specimens brown. Bichloride of mercury preserves well, but hardens specimens too much. Vegetable specimens were well preserved in oxalic acid, concentrated acetic acid, naphtha, and kreosote.

Mr. MOORE had used Goadley's solution for the preservation of substances, and found it answer better than spirit.—Dr. RICHARDSON had used Goadley's solution, but did not find it answer. A cheap medium for the preservation of animal substances was still a desideratum: at present, spirit he believed best.—Dr. LANKESTER stated that he had specimens of animal substances preserved by injecting the veins and arteries with arseniate of potash and bichloride of mercury, and the whole immersed in a strong solution of common salt. This plan was pursued in the dissecting room of Dr. A. LIZARS, of Edinburgh, and enabled the students to pursue the most delicate dissections years after the death of the subject.

Mr. MOORE, of Manchester, exhibited specimens of parasites found on the salmon in fresh and sea-water. They differed much in structure. The freshwater parasite left the animal as soon as it arrived at the sea, but the parasite of the salt water remained on the animal a long time after it reached the river. Specimens of the *Argulus foliaceus* were also exhibited, which attacked the carp in the ponds of Manchester: although they attacked the common carp, the gold and silver carp were quite free from their presence. Might not the presence of the parasites on salmon be a cause of their migration? Did their presence indicate a state of disease?

Sir W. JARDINE had seen the salt-water parasite on the salmon 50 miles above the sea. The abundance of these parasites was looked upon by fishermen as an indication of the fish being in good condition. Cod were most affected by parasites when in worst condition. Other causes would account better for migration.—Dr. LANKESTER believed that parasites were rather the result than the cause of disease: a certain condition of the body attacked being necessary to the development and nutrition of the parasite, and this was the case in both the vegetable and animal kingdom, and with regard to animal and vegetable parasites. When crops were attacked with blight, aphides, &c., the cause would be found in a state of the atmosphere or of the soil, which first made the plant sickly, and then gave rise to the development of the parasite.—Mr. E. SOLLY, jun. thought the state of the plant might induce the action of the parasite. He wished to know if any of the members had observed that any of the artificial manures now in use had any tendency to produce plants subject to blight.—Mr. WEBB HALL stated, that certain states of the atmosphere, as well as certain kinds of manuring, produced a condition in the plants of wheat, &c. which were favourable to the development of insects and fungi upon them. He could speak to the effects of particular kinds of manure.—Mr. BABINGTON had seen some corn, a portion of which was watered with pure water, another with nitrate of soda in solution; the result was that the latter was very much more mildewed than the former.—The Rev. J. READ observed, that it did not appear that inorganic elements remained in the plants. He had watered plants with solutions of nitrate of soda, and although benefited by its influence, the ashes of these plants when analyzed did not contain more nitrate of soda than those of plants not so treated.

Dr. RICHARDSON read a description of a new genus of fishes called *Machairina subduens*. The specimen came from Port Essington, in New Holland, and nearly resembled the *Echiodon Drummondii*, lately discovered in the Irish seas, by Mr. Thomson. This fish must be considered as a sub-generic form of *Ophidium*, and is very nearly related to the *Blemires*.

Mr. WEBB HALL exhibited a specimen of the nest of a wasp, which was found attached to a twig within a deserted bee-hive. The nest was about the size of

a pigeon's egg, and consisted of two globular layers of membrane, one above the other, with two apertures, the external one much smaller than the internal one. In the internal one there was a single tier of cells five or six in number, in which the ova were deposited.—Mr. BABINGTON stated, there were many species of wasp, besides the common one, in this country, that formed pendulous nests, similar to the one now exhibited.

Mr. BLACKWALL read a paper on the Palpi of Spiders. It was a report of his researches with reference to this subject, since he made a communication to the Association at its meeting at Cambridge. The practical result of most consequence appeared to be that the full development of the palpal organs indicates a state of maturity in male spiders, and this knowledge will be useful in preventing the arachnologist from falling into the too common error of mistaking young spiders for old ones, and of describing them as distinct species.

Mr. PATTERSON expressed a hope that Mr. Blackwall would pursue his researches, and draw up a report on the subject for their next meeting. This was acceded to by Mr. Blackwall.

#### SECTION F.—MEDICAL SCIENCE.

President.—E. HOLME, M.D.

Vice-Presidents.—J. L. BARDLEY, M.D.; C. B. WILLIAMS, M.D.

Secretaries.—Dr. SARGENT and Dr. CHAYTOR.

Committee.—Drs. Fleming, Lyon, D. Hulme, Messrs. W. J. Wilson, F. Turner, J. A. Ransome, Dr. Roget, Messrs. Robertson and Noble.

Dr. Satterthwaite, Mr. Williamson, Prof. Allison, and Dr. Hodgkin.

Dr. SARGENT read a communication from Sir David Dickson, containing a report of a case of ascites with enormous distension, the abdomen containing twenty-nine imperial quarts of very viscid straw-coloured serum; and a case of sudden death, from the bursting of a thoracic aneurism.

Prof. WILLIAMS read a paper 'On the Construction and Application of Instruments used in Auscultation.' To express the acoustic law, according to which all improvements in the stethoscope must be attempted, he deemed of great importance; and this law he stated to be, that sounds are best conducted by bodies of an elasticity or tension resembling that of the sonorous body; on the other hand, bodies differing in elasticity are bad recipients of each other's vibrations. Thus, sounds produced in air (vocal and breath sounds) are best transmitted by an enclosed column of air; those produced by solids (those of the heart, rhonchi, friction) are better communicated by rigid solids of moderate density. He proceeded to show how these principles were applicable to explain the form and material he has adopted in the stethoscope, and detailed a number of experiments by which he demonstrates the imperfection of the proposed flexible stethoscope, which only transmitted the sounds explored through the inclosed column of air in its central cavity. On the other hand, the assertion of Dr. Cowan, though supported by Prof. Forbes, that plugging the cavity of the rigid wooden stethoscope does not materially impair its efficiency, Prof. Williams proved, by experiment, to be erroneous; but the impairment is least when the aurile end of the instrument is plugged. In making experiments of this kind, he insisted on the necessity of having some faint sound as a test sound (as the opticians have a test object), one just within the bounds of audibility, as the sound of expiration, or a faint cardiac murmur. The necessity for an inclosed column of air was proved by making an opening in the side of the pectoral extremity of a common stethoscope, the efficiency of which was thus destroyed, but was instantly restored by closing the aperture. Following the assertion of acoustic writers, that the pulses of sound pass through air in straight lines, like rays of light, Prof. Williams had formerly recommended the enlargement in the pectoral extremity of the instrument to be made in the form of a straight cone, instead of the parabolic hollow used by Laennec; but subsequent experiment proved to him that a trumpet or bell-shaped termination was the best; this enlarges the surface from which the sounds are collected, without proportionally enlarging the cavity, which would give rise to a conchal or tinkling echo. Another advantage may be derived from this form of termination, in its being capable of being reversed; the aurile extremity serving to shut out diffuse sounds, when we wish to examine one spot only. Prof. Williams concluded, by making a few remarks on percussion, which he stated to be modified by the force adopted; thus, gentle and flat per-

cussion reaches and is toned by superficial parts only, whilst, if forcible, it reaches and is toned by deep seated parts also. He stated, that the strokes differed, not only in loudness, but also in pitch, or musical tone. Disease, he stated, could frequently be detected by percussion, before auscultation gave any indication.

#### SECTION F.—STATISTICS.

President.—Mr. G. W. WOOD, M.P.

Vice-Presidents.—Lieut.-Col. SYKES, Mr. H. HALLAM,

Sir C. LEMOS, Bart., Mr. G. R. PORTER.

Secretaries.—Rev. R. LUNNEY, Mr. G. W. OMBROD, Dr. W. C. TAYLOR.

Committee.—Marchese Torrigiani, Dr. Allison, His Excellency Edward

Everett, Messrs. J. Robertson, W. Felkin, W. Langton, P. M. James,

J. Heywood, R. H. Grey, G. Webb Hall, S. Turner, J. N. Walker,

H. I. Porter, J. Shuttieworth, H. E. Ashworth, A. Watt,

H. Woolcombe, D. Noble.

Mr. WEBB HALL read a paper by Mrs. Davies Gilbert, 'On the results of Spade Husbandry, Small Allotments, and Agricultural Schools.' It was a continuation of the communication made to the Section at Plymouth (*Athen.* No. 721); and showed that small allotments cultivated by the spade were profitable to the landlord and beneficial to the labourer. Out of four hundred tenants during the space of eleven years, not one was in arrear, and not one had been brought before a magistrate. The school was self-supported, the labour of the boys paying for their education.

Mr. PORTER stated that the system of small allotments and agricultural schools had been established in Ireland, and had produced most beneficial results, and that the adoption of it had been suggested by Mrs. Gilbert's communication to the Plymouth meeting.—Mr. Felkin directed the attention of the meeting to the happy condition of the Saxon weavers, who have small farms on which they can fall back when manufactures are not in demand.—Messrs. Webb Hall and G. W. Wood cautioned the meeting against supposing that the introduction of this system would everywhere produce the same beneficial results which had followed its adoption in Eastbourne.

Mr. NOBLE read a paper 'On the Influence of the Factory System in the development of Pulmonary Consumption.' He compared the prevalence of consumption in the manufacturing town of Manchester, with its amount in other places where there is little or no manufacture. According to the census of 1831 there were 49,932 families resident in Manchester and Salford; the entire registered deaths in 1839 were 9,223, and the cases of consumption 1,454, that is, 1 death from consumption out of every 34 families, and 3 from consumption in every 19 deaths from all causes. In agricultural Essex, with a population of 62,403 families, the deaths from consumption in 1839 were 1,201, and the total number of deaths 6,352; being, in the agricultural district, 4 in every 21, and in the factory district but as 3 in 19. In the district embracing Cambridgeshire, Huntingdonshire, and the southern divisions of Lincolnshire, comprising a population of 67,351 families, the deaths from all causes were 7,306, and those from consumption 1,308, or nearly 1 death in every 5. Thus the general mortality was lower in the agricultural districts, but the proportion of consumptive cases to deaths was greater. In Liverpool, out of 43,026 families, the deaths for 1839 were 9,181, and the deaths from consumption 1,742. Thus in Liverpool there are 2 deaths from consumption out of every 49 families, and in Manchester only two out of every 68. In Birmingham the condition was more favourable, being nearly 1 death from consumption out of every 36 families. In London the rate is 2 deaths from consumption out of every 105 families, and the proportion of consumptive cases to deaths from every cause exactly the same as Manchester, or 3 out of 19. With the exception of the metropolis, Manchester has fewer consumptive cases in proportion to the number of deaths from every cause than any of the districts above mentioned; and hence Mr. Noble inferred that factory labour has no direct tendency to produce consumptive disease. Taking the register of deaths for three years in the township of Manchester between the ages of fifteen and forty, the following results were obtained: 174 consumptive deaths were of persons employed in factories, 590 of persons registered in various occupations, and 377 without any stated employment. Of the factory operatives 45 were spinners, 49 winders, 28 piecers, 15 reeler, 11 carders and frame-tenders each, and 10 stated generally to be employed in factories. The general



conclusion from these and similar facts was, that factories have no special influence in producing scrofulous disease, or its peculiar manifestation, consumption.

Dr. ALISON, in a few brief remarks, confirmed generally the accuracy of Mr. Noble's views.

#### SECTION G.—MECHANICAL SCIENCE.

President.—Rev. Prof. WILLIS.  
Vice-Presidents.—Messrs. W. FAIRBAIRN, E. HODGKINSON,  
Sir M. I. BRUNEL, Sir J. ROBINSON.  
Secretary.—Messrs. J. THOMSON, J. S. RUSSELL, I. F. BATEMAN,  
C. VIGNOLES.  
Committee.—Sir G. Stephenson, Messrs. E. Woods, J. Taylor, P. Clare,  
R. Roberts, J. Whitworth, J. Nasmyth, G. W. Buck, A. Liddell,  
Prof. Moule, Messrs. J. S. Eays, J. I. Hawkins, J. Grantam,  
Capt. Phipps, Mr. Tait, The Baron Von Bach, His Excellency  
M. Reichel, of St. Petersburg, Messrs. J. Kennedy, P. Taylor,  
C. Fox, J. Marshall, Glynn, R. Grantam, Hoblyn, Dent.

Prof. Willis, President, in the chair. After a few preliminary observations by the President, Prof. Willis, and Sir J. Robinson—

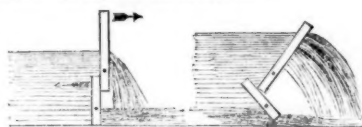
Prof. VIGNOLES read the Report of the Committee on Railway Sections. He stated that a grant had been made by the Association of 200*l.*, for the purpose of obtaining profiles and sections of railways. Labour directed by science, and supported by commercial enterprise, laid bare the structure of highly interesting mineral districts in the deep chasms of railway cuttings; and to obtain accurate representations of these from actual observation and measurement, before they were soiled over and covered with vegetation, was the object of the Committee; and they offered these drawings as a valuable record of geology to the philosopher and a guide to the practical engineer. Every method had been pursued which could ensure accuracy; and the drawings (which were enumerated) were to be deposited by order of the British Association in the Museum of Economic Geology, to serve as a permanent reference. In conclusion, he expressed a hope that after another year's trial of the great utility of these profiles and sections, the subject would be taken up by government, and carried out in the Geological Survey of Great Britain, now conducted by Sir H. De la Beche in conjunction with the Trigonometrical Survey under Col. Colby.

Mr. BATEMAN observed, that a report and drawings on the same subject were in preparation of the Manchester and Liverpool Railway.—Prof. WILLIS suggested that it would be desirable that all plans and drawings of this description should be laid down on the same scale, by which means greater facility of reference and comparison would be obtained.

Mr. BATEMAN read a paper 'On a new Self-acting Weir and Scouring Sluice,' of his invention. He remarked, that the great objections to fixed weirs and dams were, that by causing a partial stagnation in the water above them, they allowed the bed of the stream to be silted up by the deposition of mud, gravel, &c., whereas the proposed weir would adjust itself to the various changes in the condition of the stream, and prevent any filling up of the channel by making the stream clear itself. Mr. Bateman's weir is composed of two leaves turning horizontally on pivots, which are placed below the centres of the leaves, so that the upper portions of them shall be of much greater area than the lower. The upper leaf is also far larger than the lower, and turns in the direction of the stream; while the lower leaf turns against the stream, and overlaps the bottom edge of the upper leaf, and is forced against it by the pressure of the water. The comparative area of the leaves and position of the pivots is so arranged, that in ordinary states of the stream the tendency of the current to turn over the top leaf is counterbalanced by the pressure of the water against the overlap of the bottom one, the counteracting pressures keeping the weir vertical and the leaves closed, the water flowing as usual through a notch in the upper leaf. But when the water rises above the usual level, the pressure above, from greater surface and leverage, overcomes the resistance below, and the top leaf turns over, pushing back the lower leaf, and thereby offering the least possible obstruction to the water, and giving a passage at the very bottom of the stream to the gravel or mud.

In answer to questions and objections, Mr. Bateman explained how difficulties, arising from trees growing down, the complete turning over of the leaves, &c., might be obviated by suitable stops, gearing, &c.—Sir J. ROBINSON observed, that the

Rotterdam Canal had weirs on a similar principle; but Mr. Bateman explained that those weirs turned vertically on their axis. The following diagrams will explain the construction of the weir:—



Mr. VIGNOLES stated, that from the cheapness and apparent advantages of this weir, he should bring it under the consideration of the Commissioners of the Shannon Navigation, and recommend it for trial on that river, to which it appeared peculiarly applicable.

Mr. LIDDELL read a paper on Ventilation, on a method proposed by Mr. Fleming, of Glasgow. It had been tried in a large building occupied by a number of poor persons, each family having a room. From the unclean and intemperate habits of the inmates, and their number (about 500), the house was very unhealthy, and many deaths from contagious diseases took place. In the plan adopted, the galleries were traversed by pipes of nine inches diameter, which united in a vertical pipe of large dimensions communicating with a lofty engine-house chimney; and small pipes of one inch diameter, at the top of each room, communicated with the pipes in the gallery. This plan had also been tried in the Glasgow Fever Hospital, in which the beds for fever patients, &c. were fitted up with the tubes for carrying away noxious effluvia. A similar plan for the ventilation of ships and steamers had been introduced by Dr. Reid, by leading tubes from the berths into a stove on deck, or, in steamers, into the chimney. Mr. Liddell stated that the expense for a house of 60,000 cubic feet was only 40 *lb.* of coal in twenty-four hours.

Sir J. ROBINSON remarked, that from his experience the plan of Mr. Fleming, as far as regarded the size of the pipes, was inadequate.

Prof. VIGNOLES made a communication on Straight Axles for Locomotives. He stated that an unfounded prejudice existed in favour of cranked axles, which, in his opinion, were inferior to straight ones in almost every point of view. With straight axles the cranks were thrown outside the wheels, which gave more room for the arrangement of the working parts; and another great advantage was gained by lowering the boiler nearly fifteen inches, and thereby increasing the safety of the engine, by placing the centre of gravity nearer the rail. The original expense of the engine and of the repairs was also much lessened. These advantages might be shown by a reference to the Dublin and Kingstown Railway. By introducing straight axles and outside cranks the expenses had been greatly decreased, no accident had ever occurred from breakage; and such increase of room had been obtained, that they had placed the tender underneath the engine, thus fixing the centre of gravity as low as possible, and dispensing with the separate tender. By this arrangement they could run fifteen miles without stopping for water. He had found much difficulty in introducing the straight-axled engine on this line; and, in fact, the great obstacle in obtaining a fair trial for different forms of engines arose from the fluctuation in public opinion. Straight axles and cranked axles, four-wheeled and six-wheeled engines, had been used on different lines, not so much from the recommendations of the engineer as in compliance with the opinion of the several railway boards. Just now a prejudice existed against four-wheeled engines, as being less safe than six-wheeled, more liable to run off the line, &c., whereas he contended that the four-wheeled engine *per se* was not open to these objections. He believed that the principal advantage which could be claimed for the six-wheeled engine was in the disposition of the weight on the wheels; and a consideration of the fatal accidents which had lately occurred on the London and Brighton and the Paris and Versailles railways, would show that they arose from other causes, and had no reference to the engine having four wheels or six. He considered that both accidents arose from similar causes: in both cases heavy trains and two engines were coupled together, the smaller one leading; from some cause a check took place, the engine-man shut off the steam of the leading engine, and the following

engine, with the immense momentum derived from weight and velocity, struck against it, forcing it off the rails, and causing the overturn of the carriages. It was considered objectionable to use an auxiliary engine behind a train, because, in case of any retardation of the engine in front, it cannot be checked in time to prevent great concussions of the carriages. Similar objections applied to using two engines under any circumstances, especially when of unequal power. Many accidents had taken place in consequence of the breaking of cranked axles; and M. François and Col. Aubert, in their report to the French government, had remarked that the fractures of broken axles, instead of the fibrous appearance of wrought iron, presented the crystallized appearance of cast iron, which they attributed to magnetic or electric changes in the molecular structure of the iron, caused by friction in the bearings and great velocities; and in his opinion it was probable that the continual strains and percussions to which the crank axle is subjected will account for the changes in the molecular constitution of the iron.

Mr. HODGKINSON was certain, from the results of his experiments, that a succession of strains, however slight, would produce a permanent deterioration of the elasticity of the iron.—Mr. FAIRBAIRN had been told by the engineer on the Leeds line, that he considered all crank axles to be constantly deteriorating from percussions, strains, &c., and that they should be removed and replaced by new ones periodically, to avoid danger of fracture.—A discussion arose as to whether the crystallized appearance observed in fractured axles arose from defects in the manufacture, in the quality of the iron, or from the effects of working, either by percussions, strains, or magnetic action.—Mr. GRANTHAM, although a manufacturer of cranked axles, admitted that straight axles were less liable to break. Cranked axles, from the way in which they were welded together and shaped, were rendered weak and liable to fracture. On other grounds, however, he believed that the cranked axles were preferable, as they produced a steadier motion, and much heat was saved.—Mr. GARNETT believed that more straight axles had broken than cranked ones.—Prof. WILLIS showed the effect of vibration in destroying molecular arrangement, by reference to the tongues in musical boxes, &c.—Mr. NASMYTH believed that the defects in axles, &c. arose in the manufacture, especially from cold swaging and hammering, and also from over-heating in welding, all of which causes injured the toughness of the iron. In small articles he found great advantage from annealing; and he believed that axles might be annealed very cheaply, and would be more serviceable. He disliked the fashion of referring all unaccounted phenomena to magnetism and electricity, although he was convinced that very singular electric phenomena accompanied the transit of locomotives and the rapid generation of steam. With this was connected the non-oxidization of rails, where the traffic was in one direction, and the rapid oxidation when the same rails were travelled over in both directions, as in the Blackwall railway. He had also observed that brasses, in some cases, had from friction entered into cold fusion,—that is, at a heat not perceptible to the eye, a complete disintegration of the molecular structure had taken place, and he had seen the brass spread as if it had been butter or pitch. He had no doubt that this arose from electricity, but had not ascertained the fact from experiment.—Mr. FAIRBAIRN stated, that in hand-hammered rivets the heads frequently dropped off, and presented a crystallized appearance, while those compressed by machine were sound. He found that repeated percussions, from the rivetting, hammering plates, &c., induced magnetism in iron bolts.—Mr. VIGNOLES could not, from his experience, agree to Mr. Nasmyth's theory of the oxidation of rails by single traffic, as the railway from Newton to Wigan had been single for a long time, and was as bright as the Manchester and Liverpool. The Blackwall railway was not an analogous case, as no locomotives were employed.—Mr. ROBERTS disbelieved the deterioration of axles by work; he would rather trust an old axle than a new one. He believed cold swaging and hammering to be the chief causes of mischief. In fact, if axles were sent out sound and well manufactured, they would rather improve by working.

## GENERAL MEETING.—THURSDAY EVENING.

Prof. WHEWELL, on taking the chair, referred to the honour which had been conferred on him by choosing him to preside over the meeting at Plymouth. He had now only to deliver the sceptre of authority to Lord Francis Egerton. The torch of knowledge, which was kindled by genius, had now been transferred from Plymouth to Manchester.

*Et quasi cursores musarum lampades tradunt,*  
which he would venture to translate—

As in the torch-race of the Grecian youth,  
We pass from hand to hand the lamp of truth.

Having filled almost every office in the Association, he naturally felt a deep interest in its future fortunes, and particularly as to what should be done when the Association had gone round of all the large towns of England. Hitherto, its motto had been "Fresh fields and pastures new," and no place which had been visited was superior to Manchester. Three courses seemed open to the Association: 1, the smaller towns might be visited; 2, the places where the Association had already met might be revisited; or 3, the meetings might be suspended for two or more years. He was of opinion, that while new places could be visited, it was inexpedient to repeat the cycle of visits—unless an exception might be allowed in favour of York, which had been the birth-place of the Institution. Should public interest in the Association decline, he was of opinion that it would be the wiser plan to suspend their meetings for some intervals. He believed and trusted, however, that this was still a distant prospect, and he turned to the more agreeable topic of his returning with this great scientific body to the county of his birth, and the place with which all the agreeable recollections of his childhood were connected. He felt equal pride and pleasure in being one of the many aggregated round the venerable Dalton, who had the highest name in chemistry in any part of the globe. With feelings, not less gratifying, he would now resign his place to Lord Francis Egerton, who possessed so high and well-merited a character in literature and art, and whose Presidency over a scientific association was a noble exemplification of the bond which binds together, in harmonious union, all the branches of mental cultivation.

Lord F. EGERTON then took the chair, and called for the Treasurer's report. [We gave this last week.]

Prof. PHILLIPS then read the programme of the proceedings, already laid before the general committee. Lord F. EGERTON then addressed the meeting, and said—

Gentlemen,—Years have now elapsed since, by the exertions of individuals, most of whom are now present, the prototype of this meeting was held in the city of York; and so successful was that first experiment, that it has been annually repeated. The order and course of the proceedings of the body there constituted and arranged, has not, I apprehend, been strictly uniform, but I believe, on the whole, it has been usual, that on the occasion of its annual assemblage, those proceedings should be open to some observations incidental to the occasion, on the part of the President; and this preliminary duty I am anxious, to the utmost of the very limited means of my ability, to execute. In the earlier meetings of this Society, and on occasions when the office I now hold has been filled by men distinguished by scientific acquirement, it was, I believe, found possible and convenient for such Presidents to include in a preliminary discourse, a compressed but instructive statement of past proceedings and present objects. The punctual and complete observance of such a practice, indeed, could not be consistent with those arrangements which admit to the occasional honour of your Presidency, individuals, selected, like myself, not for any scientific pretensions, but from the accidents of local connexion with the place, rather than the objects of the assemblage. I apprehend that other reasons of equal urgency exist, calculated to make this custom one of partial observance. The operations of this Society have grown with its growth, and expanded with its strength; and I am happy to believe that it would be difficult for the most able and instructed of those with whose knowledge I am proud, for the moment, to find my own ignorance associated, now to compress into reasonable limits, and to reduce to terms adapted to a mixed audience, a satisfactory summary of scientific proceedings, past and contem-

plated, connected with the labours of this Society. If, indeed, I look to the proceedings of the last year's meeting at Plymouth, I find some warrant for this supposition. You met last year, indeed, under different auspices. I cannot forget—I wish for the moment you could—how your chair was then filled and its duties discharged. Could you forget the fact, it were hardly to my interest to awaken your recollection to it, that such a man filled last year at Plymouth, an office which I now hold at Manchester. I do so for the purpose of remarking that he, more able, perhaps, than any man living in this country to give you a concise and brilliant summary of all that he and his fellow labourers are doing, forbore in his discretion from that endeavour. If he, then, who is known in matters of science to have run

"Through each mode of the lyre, and be master of all," abstained from that undertaking, I may now be excused, not for my own silence, which would require no apology, but for not calling on one of your other functionaries to supply my place for the purpose.

Slightly, indeed, before I sit down, I may presume to touch on one or two topics which I may consider immediately illustrative of the advantages of this Institution. In the first instance, however, allow me to indulge for a moment in the expression of feelings of congratulation on the subject of the particular locality which sees us here together. Guests and strangers will excuse me—inhabitants, I think, will sympathise with me, if, as a neighbour, and all but an inhabitant, I indulge in some avowal of complacency on this subject. It is not merely that to this spot from which I now address you, mechanical invention and skill have long been attracted as to one of their principal centres; nor that a neighbourhood so rich in mineral treasures bears its own recommendation to the followers of several important branches of natural science. These, with a host of other local reasons, might well justify the selection of Manchester as a place of scientific assemblage. It has, in my opinion, a claim of equal interest as the birth-place, and still the residence and scene of the labours of one whose name is uttered with respect wherever science is cultivated, who is here to-night to enjoy the honours due to a long career of persevering devotion to knowledge, and to receive, if he will condescend to do so, from myself, the expression of my own deep personal regret, that increase of years, which to him, up to this hour, has been but increase of wisdom, should have rendered him, in respect of mere bodily strength, unable to fill, on this occasion, an office which, in his case, would have received more honour than it could confer. I do regret that any cause should have prevented the present meeting, in his native town, from being associated with the name of Dalton as its President. The Council well know my views and wishes in this matter, and that, could my services have been available, I would gladly have served as a door-keeper in any house where the father of science in Manchester was enjoying his just pre-eminence.

It is no part, as I consider it, of my present office to discuss the reasons which have induced others to suppose that I might hold it, at least, without prejudice to the interests of the Society, or of this meeting. With those who originated its efforts, who conceived its formation, and who have tended it from its cradle in York to its present vigorous maturity in Manchester, I respectfully leave my apology. In addressing to you any remarks on the objects we are met to promote, I can only do so in one way, by endeavouring to convey to you the impressions of an unscientific man—the reasons which induce me, as such, to wish success to its operations, and to defer to the judgment of those who have thought I might be of service in my present position. All readers of German literature must have observed the frequent recurrence of a word which signifies the position from which an object is viewed by the spectator—the Standtpunkt, or place of standing. My view of the vast temple of science which, raised by successive architects, is daily deriving new additions, is dim, and distant, and shadowy. Not even a proselyte of the gate, far less a Levite of the sanctuary, I cannot mould my lips to any Shilboleth of entrance; and though I fain would worship at a distance, the echo of the ritual falls too faintly on my ear to allow me to join in the service of the altar. The pile is a vast one; but who shall live to pronounce it complete?

New edifices are daily arising round the central structure. Many a shaft remains to be polished, and many a capital to be elaborated into new forms of fitness and of beauty. The architects, I know, are at work. I hear with you the clink of the trowel and the hammer. The builder is busy on the ground from which Bacon cleared the rubbish of centuries, and shaped the vast esplanade, the Moriah of philosophy, into a fit foundation for the subsequent erections of Newton and others. All this is going on—I may and do congratulate you on the fact; but it is not for me to describe and particularize the progress of the labour. This will be done by the builders themselves in those sectional departments into which they have divided themselves. There the geologist will teach and learn the results of recent research and adventurous travel. Mr. Lyell is still, I believe, pursuing his investigations in the distant regions of the New World, but Mr. Murchison is returned rich with the results of his exploration of an interesting portion of the Old, and to tell you how highly and how justly such objects and such labours as his have been appreciated, how honourably to himself they have been assisted and promoted by the sovereignty of those vast domains. With the political nature or extent of that sovereign's power we have here nothing to do. *Quid bellicosus Cantaber aut Scythes cogitet* is no subject for our thoughts or disquisitions; but his liberal appreciation of science, as evinced in the recent case of my friend Mr. Murchison, is worthy of our warmest acknowledgments; and I trust that those distinguished men among his subjects who have honoured us with their presence on this occasion, will bear back to him evidence of the fact, that the followers of science in England duly appreciate his conduct towards their countrymen. You will learn in those Sections through what new channels the electrical inquirer has directed the fluid which Franklin snatched from Heaven, into what shapes, and what service, the grasp of science has compelled the imponderable Proteus it is his mission to enslave, to his bidding. The communication and the discussion of these past achievements, the suggestions of new methods and branches of inquiry which spring from such discussion, are among the main purposes of our meeting, and the volumes of this Society's Transactions bear ample witness to their accomplishment. We have, indeed, no longer to deal with conjecture in this respect; we have no longer an estimate to show, but an account, a profit, and a dividend. It was well for the originators of this Society to enter into calculations of prospective advantages, to foreshow that from personal intercourse and collision, light and heat would be elicited, that dormant energies might be excited in various parts of the country by the nomadic principle of this Society, that scientific operations which require simultaneous exertion on an extensive scale, might derive their necessary element of combination, and their necessary funds, from the voluntary association of men in this shape. All this it was reasonable to predict, and fortunately it is no less easy now to show that the prediction has been in all particulars of importance ratified by the result. It has been observed on more than one former occasion,—it was noticed on the last by my predecessor in the chair, and at York in 1841,—that in the whole range of physical science Astronomy was the only one which had, generally speaking, derived direct assistance from governments, or even enjoyed what I may call the patronage of society at large. It was also remarked, with equal force and truth, that many other subjects are specially in need of that species of assistance which the power of the State, or the opulence of individuals, can afford to the otherwise solitary man of science. It has come, as you well know, within the scope of the operations of this Society to endeavour, in many instances, to meet and remedy this deficiency. To the science of the stars the first rank in the table of precedence may indeed be cheerfully conceded. Let it walk first in that dignity with which its very nature invests it, but let it not walk alone. The connexion, indeed, between that science and the State, between Greenwich and Downing Street, rests now upon the soundest principles of mutual advantage. It was not always thus that the astronomer found favour and footing in the councils of statesmen and the courts of princes. Time was when the strange delusions of judicial astrology reduced such men as Kepler to the



level of Dr. Dee; and it is melancholy to think how much of such a life as Kepler's was wasted in casting the nativities of princes, and calculating the fortunes of their foolish and wicked enterprises. The man of science has drunk these mists. The telescope of a Wellington was pointed, not like that of Wallenstein from his observatory in Egna on the heavenly host, but on the frowning masses of his country's foes. He knew but one, the Homeric *omēn*, the defence of his country and the performance of his duty. Three centuries ago, a Mr. Airy might have been distracted from his intense and important labours at Greenwich, to mark what star was culminating at the birth of a royal infant. We do not now watch the configuration of the heavens on such events; but to that Providence which has shielded the mother, and under that Providence to the love of a loyal people we cheerfully confide the fate and fortunes of the infant hope of England: still, though such delusions are swept away, it is impossible that in this maritime country the protection of the State should not in the first instance be accorded to the science which directs her fleets. Even here, as you well know, the labours of this Society have not been wanting nor inefficient. Her advice has been followed, the contribution of her friends has been accepted. It is to the suggestion and the actual assistance of this Society that the country owes the reduction of Observations now in progress under Mr. Airy; and were this the only practical result of which we had to boast, I might ask whether this were a mere trifling benefit conferred upon the nation which has accepted it at your hands. On this particular point, were it in the least degree doubtful, I might hereafter find an opportunity of appealing to Prof. Bessel, whose authority was specially quoted on a former occasion, and who will shortly be here in person to support it. Yes; and the railroad on Monday will convey in one of its carriages a most important freight. Adam Smith says, that of all luggage man is the most difficult to transport; fortunately the difficulty is not commensurate with the value of the article, weighed in the balance; but if ever accident is destined to happen on the Birmingham and Grand Junction rail-road, I hope it may be spared us on an occasion when two such companions as Herschel and Bessel are trusting their lives to its axles. May they convey to us in health and safety the illustrious stranger, the accuracy of whose observations, and the grasp of whose calculations have enabled him, if I am rightly informed, to pass the limits of our planetary system and the orbit of Uranus, to expatiate *extra humanitatem mœnia*, and to measure and report the parallax and the distance of bodies, which no contrivance of optics can bring sensibly nearer to our vision—not dangling in ante-chambers, nor wiping the dust from palace staircases.

I have been speaking of matters for some time past in progress, and notorious to all who have taken an interest in your proceedings. They are gratifying as proofs that the impulse of this Society has been communicated and felt in high quarters. It is surely desirable that, under any form of government, the collective science of a country should be on the most amicable footing with the depositaries of its power; free, indeed, from undue control and interference, uncontaminated by the passions and influences with which statesmen have to deal, but enjoying its good will and favour, receiving and requiting with usury its assistance on fitting occasions, and organized in such a manner as to afford reference and advice on topics with respect to which they may be required. One more recent instance of the operations of this Society in this respect I may mention, in addition to those I have slightly enumerated. I do not refer in detail to other most important operations which owe their origin to this Society—the Magnetic Expedition now in progress; the extension of the trigonometrical survey on an expanded scale, suggested by you, and formally adopted by the Board of Ordnance—these and many other similar matters are recorded in your Transactions; and to those Transactions, rather than to any defective catalogue of mine, I would refer those who may doubt the benefit of our labours. The most recent instance, however, I cannot omit; I mean the important accession to the means of this Society of a fixed position, a place for deposit, regulation, and comparison of instruments, and for many more purposes than I could name, perhaps even

more than are yet contemplated, in the Observatory at Kew. This building was standing useless. The Council of the Association approached the throne with a petition that they might occupy it, and I am happy to say that the sceptre was gracefully held towards them; and I think this transaction a fair instance of that species of connexion between science and government, which I hope may always be cultivated in this country. I am informed that the purposes to which this building is readily and immediately applicable, are of an importance which none but men advanced in science can appreciate. You will hear further of them in the Committee of Recommendations.

With reference to the past transactions of the Society, it would be a presumption in me to enter upon any detail. I confess, however, that on looking over the printed Transactions of the year 1839, my eye was caught by a paragraph of the introduction to Prof. Owen's treatise on the fossil reptiles of Great Britain, in which he avows that but for the assistance of the Association he should have shrunk from the undertaking of that work. The context to this passage is a vast one. Those who wish to feel the entire force of the commentary it conveys, must follow it through the pages of subtle disquisition which succeed it. I ask you, learned and unlearned alike, to give but a glance at those pages. See how the greatest—am I wrong in calling him so?—of the British disciples of Cuvier walks among the shattered remnants of former worlds, with order and arrangement in his train. Mark how, page after page, and specimen after specimen, the dislocated vertebrae fall into their places,—how the giants of former days assume their due lineaments and proportions, some shorn of the undue dimensions ascribed to them on the first flush of discovery, others expanded into even greater bulk, all alike bearing the indelible mark of adaptation to the modes of their forgotten existence, and pregnant with the proofs of wisdom and omnipotence in their common Creator. This is a portion, at least, of the results of this Society. I select it for notice, because it deals with a subject which comes, partially at least, within the comprehension of those to whom algebraical formulæ or the hieroglyphics of mathematical science are a scaled letter.

Gentlemen, I have endeavoured by these remarks to convey to you the general reasons which induced me, an unscientific man, to wish this Society success, and to endeavour to assist that success by any means at my disposal. I would ask leave, before I conclude, to further illustrate these views and feelings which are incidental to my own position, by reference to a scientific transaction of no very distant date. Some two years ago, as I have understood, an adventurous and scientific party, with Prof. Agassiz at its head, undertook the ascent of that Swiss mountain, whose name indicates that it had for ages been pronounced inaccessible to the foot of man. They applied, however, to physical difficulties in this case the energies and perseverance which have won them many triumphs over intellectual obstacles, and they succeeded. I doubt not that there were many who, from the chalet and the pasturage beneath, directed their glasses to those peaks of ice, and watched with intent and thrilling interest the progress of those adventurers. Perhaps among them were some who, by some trifling incursions into those awful regions, in pursuit perhaps of the artist's or the hunter's pastime, had learned to appreciate the dangers of the crevice, the toil of the ascent, cut step by step with the hatchet in the precipitous ice, and the general magnitude of the enterprise. Be assured, you climbers of the heights of science, and there are many of you here, that individuals so situated hail the progress they cannot share,—that they sympathize with your advances, lament when you are baffled; and that when you plant your flag on some hitherto virgin summit, their shout of applause would reach you from below,—if it could be conveyed to your organs by the pure and attenuated atmosphere it is yours, and yours alone, to breathe. Dwellers in the peopled valley as we are, absorbed by other cares, and I hope discharging other duties, breathers of a heavier and too often tainted atmosphere, we yet can look upwards. We watch and count your triumphs; and as you gain them, we gladly add your names to the list of those who have done honour to their country and service to their kind. For your labours have this

privilege, that while their results become the common property of man, for that very reason, and because they confer that common benefit, they elevate the country in which they originate in the scale of nations, and gratify the most reasonable feelings of national pride, while they fulfil to the most unrestricted extent the obligations of our common humanity.

Mr. MURCHISON moved the thanks of the Association to the President for his excellent address.

The MARQUIS OF NORTHAMPTON seconded the motion, and took the opportunity of commenting on Mr. Whewell's preliminary observations. He differed from him in the expediency of suspending the meetings of the Association; he believed that every town where it had met would be glad to receive it again, and dwelt very strongly on the claims of York to receive the Association a second time. He said that the President's speech proved, that if the Sections should cease to exist, it could not be said, "carent vate sacro." He also deemed it necessary to state, that when he waited on Sir Robert Peel to urge the propriety of continuing the Magnetic Observations, which are now carried on in fifteen places, he was accompanied by the Ambassador of Russia. This was a proof of the beneficial influence of science as a bond of union between nations, and a pledge for the progress of peace and civilization.

The meeting then adjourned to Wednesday.

#### GENERAL COMMITTEE. MONDAY.

The Committee assembled at three o'clock, to select the place for the next General Meeting of the Association. In the absence of Lord Francis Egerton, the chair was taken by Prof. Sedgwick. Two invitations were read from York, and seventeen from Cork. The delegates from York, the Rev. Messrs. Wellbeloved and Scoresby, and Mr. West, of Leeds, then stated the claims of York. Dr. W. Cooke Taylor and the Mayor of Cork spoke in favour of the claims of Ireland. The Marquis of Northampton moved, and Sir D. Brewster seconded the motion for holding the next meeting at York. Sir William Hamilton moved, and Prof. Stevelly seconded the amendment, that the next meeting should be held in Cork. After a short debate, the Marquis of Northampton withdrew his motion, and the vote in favour of Cork was carried unanimously. This decision had not been anticipated by the Council, and it was therefore necessary to adjourn the selection of officers and the period of meeting to the next meeting of the General Committee.

#### WEDNESDAY.

The Committee assembled at three o'clock, and, in the absence of Lord Francis Egerton, the chair was taken by Sir T. Brisbane.

Mr. Murchison stated that the vote which had been carried in favour of Cork was unexpected by the Council and officers, who had made arrangements for holding the next meeting at York. They had, however, since Monday, acted in concert with the principal Irish members of the Association, in preparing a list of officers which he believed would be acceptable.

The Earl of Rosse, *President*.—Sir W. Hamilton, Rev. Dr. Robinson, Earl of Listowel, Viscount Adare, *Vice Presidents*.—James Roche, Esq., *Local Treasurer*.—Professor Stevelly, Rev. J. Carson, W. Kelleher, Esq., *Local Secretaries*.

This list was adopted, and the time of the meeting was fixed for August, the precise day to be determined by the Council. Col. Sabine then read the

#### Synopsis of Recommendations involving Grants of Money.

Section A.	£. s.
For an additional year's hourly meteorological observations at Plymouth, under the direction of Mr. W. S. Harris .....	50 0
For one year's additional observations at Plymouth with Mr. Whewell's anemometer, under the direction of Mr. W. S. Harris and other members .....	10 0
For one year's additional meteorological observations at Unst, under the direction Sir David Brewster and Prof. Forbes .....	35 0
For the publication of the British Association Catalogue of Stars .....	550 0
For improvements of the anemometers in use at Edinburgh and Plymouth .....	15 0
For one year's additional meteorological observations at Inverness, under the direction of Sir D. Brewster and Prof. Forbes .....	60 0
For observations on the anomalous tides of the east coast of Scotland, under the direction of Sir J. Robison and J. S. Russell, Esq. ....	120 0

Carried forward.....£840 0

Brought forward.....	£840 0
For the revision of the nomenclature of stars, by a committee.....	32 0
For the reduction of meteorological observations, by a committee.....	75 0
For the translation of foreign scientific memoirs, by a committee.....	50 0
For simultaneous magnetical and meteorological observations, by a committee.....	89 11
For completing the reduction of stars for the revision of the Astronomical Society's Catalogue, under the direction of Mr. Baily and a committee.....	25 0
For observing and discussing the observations at Plymouth, made with Osler's anemometer, under the direction of Mr. Harris.....	20 0
For instruments employed by Prof. Forbes in researches requested by the Association.....	40 0
For constructing a self-recording meteorological apparatus, to be placed in the Association Observatory at Kew, by Prof. Wheatstone and a committee.....	50 0
For conducting experiments with captive balloons, by the Rev. Dr. Robinson and a committee.....	250 0
For upholding the establishment in the Kew Observatory.....	200 0
For experiments on the action of different gases on the spectrum, by Sir D. Brewster.....	40 0
<b>Section B.</b> .....	£1711 11
For remarks on the chemistry and physiology of respiration and digestion, by Prof. T. Graham and a committee (also applied for by Section E).....	60 0
For examining the gases evolved from iron furnaces, with a view to the economy of fuel, by Dr. Lyon Playfair and a committee (also applied for by Section G).....	50 0
For researches into the chemical history of tannin, by Dr. Kane and a committee.....	10 0
For researches into the chemical history and origin of the colouring materials used in the arts, by Dr. Kane and a committee.....	10 0
For researches in the amount of oxidation in the rails of railways, by Mr. R. Mallet.....	20 0
<b>Section C.</b> .....	£150 0
For the further illustration, by engravings, of a report on British fossil reptiles, by Prof. Owen, under the direction of Sir H. T. de la Beche and other members.....	40 0
For making coloured drawings of railway excavations.....	200 0
For registering the shocks of earthquakes in the British islands, under the direction of Dr. Buckland and a committee.....	100 0
For uncovering the lower new red sandstone, at Collyhurst, near Manchester, by Mr. Binney.....	10 0
For experiments on the temperature of mines in Ireland, by Major Portlock (also applied for in Sec. A).....	10 0
<b>Section D.</b> .....	£360 0
For printing a report on zoological nomenclature, by Mr. H. E. Strickland and a committee.....	10 0
For experiments on the vitality of seeds, by Mr. H. E. Strickland and a committee.....	16 14
For researches on marine testacea, by Mr. Pench, under the direction of Sir Charles Lygon and Mr. J. Couch.....	10 0
For continuing researches on the preservation of animal and vegetable substances, by Mr. Habington and Mr. Garmon.....	6 0
For preparing a report on British fossil mammals, by Prof. Owen, under the direction of Dr. Richardson and a committee.....	100 0
For illustrating undescribed species of anoplolepis, under the direction of Sir W. Jardine and a committee.....	25 0
For preparing report on the radiata and mollusca of the Azores and Red Seas, by E. Forbes, Esq.....	100 0
For continuing researches with the dredge on the marine zoology of Great Britain, under the direction of Mr. Gray and a committee.....	50 0
For inquiries regarding the varieties of the human race, under the direction of Dr. Hodgkin and a committee.....	5 0
<b>Section E.</b> .....	£322 14
For researches on asphyxia, by Prof. Sharpey and Mr. John Erichsen.....	40 0
For researches on the physiological operation of medicinal agents, by Dr. C. J. B. Williams and Mr. James Blake.....	40 0
<b>Section F.</b> .....	£200 0
For the continuation of reports on vital statistics, by Colonel Sykes and a committee.....	£150 0
<b>Section G.</b> .....	£100 0
For completing experiments on the forms of ships, by Sir J. Robinson and Mr. J. S. Russell.....	100 0
For the reduction of above 20,000 observations on the forms of ships, by Sir J. Robinson and Mr. J. S. Russell.....	100 0
For procuring Mori's instrument for measuring velocity, and for completing the trial of the constant indicator, by Prof. Mosley and a committee.....	100 0
For continuing experiments on the strength of materials, by Mr. E. Hodgkinson.....	100 0
For experiments to ascertain whether any and what changes take place in the internal constitution of metals, when exposed to continual vibration and concussion, as in the case of the axles of locomotive engines, by Mr. Fairbairn and a committee.....	150 0
For acquiring the apparatus used by Mr. Busen in collecting gases from iron furnaces, to aid in preparing reports on the smelting of iron, by Mr. A. Hill, Mr. Gibbon, and Prof. Gordon.....	15 0
	£565 0

## Summary of Grants.

A.....	£1711 11
B.....	150 0
C.....	360 0
D.....	322 14
E.....	80 0
F.....	150 0
G.....	565 0

Total..... £3339 5

The following Reports on different branches of Science have been requested to be prepared for the next meeting of the Association:—

On photography and its applications, by Mr. Fox Talbot—On physical optics (a second report), by Rev. Prof. Lloyd—On the structure and colours of clouds, by Mr. John Phillips and a committee—On the progress made by the German Meteorological Association, by Dr. Lamont, of Munich—On the analogy between deposits of peat and beds of coal, by Dr. Fleming—On the laws of divisional structure in rocks derivable from observation, by Mr. John Phillips—On the structure and uses of the Palpi of the Arachnidae, by Mr. John Blackwall—On the zoology of New Zealand, by Mr. J. E. Gray—On the habits of the Caprimulgidae, by Mr. J. Gould—On the present state of knowledge of the art of smelting iron (three reports), from Mr. A. Hill for South Wales, Mr. Gibbon for the Midland Counties, and Professor Gordon for Scotland—On the consumption of fuel and the prevention of smoke, by Mr. Fairbairn and a committee.

It was then resolved "That the President and officers of the British Association, with the assistance of the Marquis of Northampton, the Dean of Ely, Sir John Herschel, and Francis Baily, Esq., be appointed a committee to make application to government to undertake the publication of the Catalogue of Stars in the *Histoire Céleste* of Lalande, and of Lacaille's Catalogue of the stars in the southern hemisphere, which have been reduced and prepared for publication at the expense of the British Association; and that the President and Council of the Royal Society be requested to support this application."

[To this committee was also referred the consideration of the steps to be taken for securing a publication of the valuable results obtained through the assistance of the Association, by the committee (Sir J. Robison and Mr. J. S. Russell) who have investigated the forms of ships.]

The Treasurer then read the account of the tickets issued and the sums they produced.

Old Life Members 303.....	£.
Old Annual Members 76.....	30
New Life Members 169.....	845
New Annual Members 376.....	752
Foreign Members 28.....	
Sectional Admissions 33.....	33
Ladies' Tickets 331.....	331
Sale of books and book compositions.....	110
Total.....	£2161

The chair was taken at the General Meeting, in the evening, by the Dean of Manchester, when the usual votes of thanks were passed. Much interest was excited by the presence of the three great astronomers, Prof. Bessel, Sir John Herschel, and Sir William Hamilton, who sat together on the platform.

**General Remarks.**—We are accustomed, as our readers know, to confine our Report to the actual business of the Association, and the progress of science, as made manifest in the Sections—and our Report will be continued until complete. In the meantime, we may briefly observe, that the meeting went off with great spirit: the public institutions, and many private manufacturing establishments, were open to the members, railway carriages were at their disposal for excursions, and altogether the utmost liberality and good feeling were manifested, not only in the general arrangements, but in the welcome given by all to the Association. If anything could tempt us to break through our custom, it would be the speeches at the dinner on Saturday. The brief one of the President, Lord Francis Egerton, in proposing the health of the American Minister, Mr. Everett, and the speech of Mr. Everett in reply, were excellent—not for mere oratorical flourishes, about which we care little, but, considering the speakers as the representatives of their several nations, for the large, liberal, and generous sympathies which characterized them. The Dean of Ely, too, caught up the spirit of the scene, and worthily welcomed the distinguished foreigners present—the illustrious astronomer Bessel, the mathematician Jacobi, the scientific traveller Erman, Prof. Frisiani, Count Keyserling, and others—and Prof. Sedgwick, with excellent tact and taste, adverted, from the statue of the venerable Dalton by Chantrey, to the fact that the philosopher and the artist rose to the proud eminence of their fame from

the humbler classes, and then to the humbler classes themselves; and he let "his smile of gladness and his voice of cheerfulness" be felt and heard by the thousand artisans, crowded in the dark streets and alleys of the town in which the Association was assembled—men, as he said, whose brows were smeared with dirt, and whose hands were black with smoke, but whose intelligence and moral principles, as he had seen proof that day, were worthy of all respect, though but few among them could ever hope to rise beyond comparative poverty and obscurity. This, as our readers will see in a moment, was very different from ordinary after-dinner talk and the common-place laudations of proposing healths and returning thanks; and its influence will not be confined to the cabined chamber in which these voices were heard. Our business, however, is with less exciting questions—and we the less regret it, as a very full and able report has appeared in the *Manchester Guardian*, which, indeed, contains the best report ever given by any local paper, by any paper (we, of course, and without immodesty we trust, except the *Athenæum*), of the whole proceedings of the Association.

## MEETINGS FOR THE ENSUING WEEK.

MON. Entomological Society, 8, P.M.  
TUES. Horticultural Society, 3.  
THURS. Zoological Society, 3.—General Business.

## BRITISH INSTITUTION, PALL-MALL.

The Gallery, with the WORKS of the late SIR DAVID WILKIE, R.A., and a selection of PICTURES by ANCIENT MASTERS, is OPEN DAILY, from Ten in the Morning till Six in the Evening—Admission, 1s.; Catalogue 1s. William BARNARD, Keeper.

THE EIGHTH ANNUAL EXHIBITION OF THE NEW SOCIETY OF PAINTERS IN WATER COLOURS IS NOW OPEN at their Gallery, FIFTY-THREE, PALL-MALL, next the British Institution, from 9 o'clock till Dark. Admission, 1s.; Catalogue, 1s. JAMES FAHEY, Sec.

## DIORAMA, REGENT'S PARK.

THE TWO PICTURES, now exhibiting, represent THE VILLAGE OF ALAGNA, in Piedmont, destroyed by an Avalanche, painted by M. BOUTON; and THE SHRINE OF THE NATIVITY, at Bethlehem, painted by M. RENOUX, from a Sketch made on the spot by D. ROBERTS, R.A., in 1839. Both Pictures exhibit various effects of light and shade. Open from Ten till Five.

## CHINESE COLLECTION.

ST. GEORGE'S PLACE, HYDE PARK CORNER.

This extensive Collection, consisting of objects exclusively Chinese, comprising upwards of Fifty Figures, as large as life, in their Native Costume, from the highest Mandarin to the Mechanic; and replete with articles illustrative of their manufactures, habits, and domestic arrangements, is NOW OPEN for public inspection. Admission, 2s. 6d. each.—Open from Ten in the Morning till Ten at Night.

## ROYAL POLYTECHNIC INSTITUTION.

THE NEW ROOMS, which extend to Cavendish Square, are NOW OPEN, and the REDE LIGHT most successfully introduced in them. The NEW EDITION of the CATALOGUE includes a full description of the beautiful Models in the New Rooms. During the MIDSUMMER HOLIDAYS the Morning and Evening Lectures of Dr. Ryan, Professor Buchholzer, and the other Lecturers on Practical Science, will be adapted to the YOUTHFUL VISITORS. A Weekly List of the Lectures is suspended in the Hall.—The Twelve o'clock Lecture on Mondays, Wednesdays, and Fridays, will be on GALVANISM, at the alternate days of the OREERY. THE COLOSSAL ELECTRICAL MACHINE, DISSOLVING VIEWS, DIVING-BELL, and DIVER, &c.—Admission, 1s. Schools half-price.

**Erratum.**—A blunder in our last paper must have amused some of our university friends. It was there stated that Dr. Arnold was elected a Fellow of Oriel from Christ College, Cambridge. The truth is, the familiar C.C.C. for Corpus Christi College, was thus translated by the compositor, and except observation.

## PROFESSOR LIEBIG'S NEW WORK.

Just published, in 8vo. price 3s. 6d. cloth.

**ANIMAL CHEMISTRY**; or, the Application of Organic Chemistry to the Elucidation of Physiology and Pathology. By JUSTUS LIEBIG, M.D., Professor of Chemistry in the University of Giessen. Edited from the MS. of the Author, by WILLIAM GREGORY, M.D., Professor of Chemistry, King's College, Aberdeen.

"While we have given but a very imperfect sketch of this original and profound work, we have endeavoured to convey to the reader some notion of the rich store of interesting matter which it contains. The chemist, the physiologist, the medical man, and the agriculturist, will all find in this volume many of the most useful practical remarks. It is the first specimen of what modern organic chemistry is capable of doing for physiology, and we have no doubt, that from its appearance physiology will date a new era in her advance."—*Quarterly Review*, No. 139.

Taylor & Walton, 28, Upper Gower-street.

8, New Burlington-street, July 2, 1846.

**MR. BENTLEY HAS JUST PUBLISHED** THE FOLLOWING NEW WORKS:—

1. PEREGRINE BUNCE; or, Settled at Last. By THOMAS BUNCE, Esq., Author of 'Sayings and Doings.' Jack Bragg, &c. 3 vols.

2. ROMANTIC BIOGRAPHY OF THE AGE OF ELIZABETH; or, Sketches of Life from the Bye-ways of History. By the BENEDICTINE BRETHREN OF GLENDAUGH. Edited by W. C. TAYLOR, L.L.D., of Trinity College, Dublin. 2 vols. 8vo. with Portraits.

3. THE AMBASSADOR'S WIFE: a Novel. By Mrs. GORE, Author of 'The Dowager,' &c. 3 vols.

4. NARRATIVE OF THE SECOND CAMPAIGN IN CHINA. By KEITH STEWART MACKENZIE, Esq. Late Military Secretary to the Commander-in-Chief. 1 vol. post 8vo.

5. THE WARD OF THORPE COMBE: a Novel. By Mrs. TROLLOPE, Author of 'The Widow Barnaby,' &c. 3 vols.

Richard Bentley, New Burlington-street, (Publisher in Ordinary to Her Majesty.)



MR. WEALE'S PUBLICATIONS.

**ADCOCK'S RULES AND DATA for the STEAM ENGINE**, both Stationary and Locomotive. 2s. 6d.

**AIKIN'S DESIGNS for VILLAS and other Rural Buildings**. 4to. 31 Plates, coloured, 12. 1s.

**AINGER'S BUILDING ACT** (nt Large), side references; with Extracts from the Sweets' Acts, and Notes. 2s. 6d. boards.

**ALEXANDER of YORK'S METHOD of WARMING and VENTILATING MEETING HOUSES**. 4to. Plates, 10s. 6d.

**ARMSTRONG'S ESSAY on the BOILERS of STEAM ENGINES**. 8vo. numerous Woodcuts, extra cloth boards, 8s.

**ARUNDALE and BONOMI'S GALLERY of ANTIQUITIES**, selected from the British Museum: EGYPTIAN. Seven Parts, 4to. 2s. 6d. each.

**ATMOSPHERIC RAILWAY**. A Letter to the Earl of Ripon, by J. Pinn, Esq. Plates, 8vo. 2s., 2nd edition.

**BARLOW'S TREATISE on the STRENGTH of TIMBER, CAST IRON, MALLEABLE IRON, and other Materials**. 8vo. with several Plates, price 16s.

**BARLOW'S ELEMENTARY INVESTIGATION of the THEORY of NUMBERS**. 8vo. 8s.

**BEAMISH'S POPULAR INSTRUCTIONS on the CALCULATION of PROBABILITIES**. Translated from the French of M. A. QUETELET. 12mo. extra cloth boards, 1s. 6d.

**BLAND'S EXPERIMENTAL ESSAYS on the Principles of CONSTRUCTION in ARCHES, PIERS, BUTTRESSES, &c.** 8vo. with 107 Woodcuts, cloth boards, 7s.

**BLORE'S MONUMENTAL REMAINS of NOBLE and EMINENT PERSONS**. Imp. 8vo. fine plates, 12. 10s.

**BRIDGES.—THEORY, PRACTICE, and ARCHITECTURE of BRIDGES: the Theory and Papers by Mr. HANX. of King's College; Prof. MUSELEY, M.A. King's College; ROBERT STEVENSON, C.E., Edinburgh; and T. HUGHES, C.E.**  
Vol. II. consists of a PRACTICAL ENGINEERING and ARCHITECTURAL TREATISE on BRIDGE BUILDING, by W. M. HOSKING, F.R.S., Archt. and C.E.  
3 vols. royal 8vo. in Two Divisions, 3l. 18s. Copious Text, and 120 elaborately engraved Plates, with every Detail and Dimensions for Practical Use.  
\* \* This Work will very shortly be completed.

**BRIDGEN'S INTERIOR DECORATIONS, DETAILS, &c. of SEFTON CHURCH**, of the time of Henry III. (Tudor style). Plates, folio, 12. 1s.

**BROOKS'S TREATISE on the IMPROVEMENT of the NAVIGATION of RIVERS**. Cloth bds. 5s.

**BUCK'S PRACTICAL and THEORETICAL ESSAY on OBLIQUE BRIDGES**. In 4to. with large Plates, extra cloth boards, 14s.

**BUSBY'S DESIGNS for VILLAS and COUNTRY HOUSES**. 4to. Plates, coloured, boards, 16s.

**CHATEAUNEUF'S (Architect, of Hamburg.) ARCHITECTURA DOMESTICA**. In 4to. with fine Engravings, 12. 1s. extra cloth boards, or on large paper, proof impressions, 12. 11s. 6d.

**CHIPPENDALE'S 133 DESIGNS of INTERIOR DECORATIONS in the Old French Styles**. 4to. 12. 1s.

**CLARKE'S ELIZABETHAN ARCHITECTURE**. Plates, imp. 8vo. cloth boards, 12. 1s.

**CLEGG'S PRACTICAL TREATISE on the MANUFACTURE and DISTRIBUTION of COAL GAS**. In a handsomely printed 4to. vol. with very numerous Plates and Woodcuts explanatory of the whole system of Gas Manufacture, in extra cloth boards, 12. 8s.

On the ARCHITECTURE of MACHINERY. In 4to. with numerous Diagrams, extra half morocco, 12s.

**COCKERELL'S ANTIQUITIES of ATHENS and other Places of GREECE, SICILY, &c.** Supplementary and Fifth Volume to the Antiquities of Athens, by R. C. COCKERELL, Esq. &c. Imp. folio, uniform with the Original Edition of Stuart and Revett, and the Diletti's Works, numerous beautiful Plates, boards, 6d. 12s.

**DENTON'S METHOD of MODEL MAPPING**. Plates, 8vo. 4s., 2nd edition.

**DESIGNS of ORNAMENTAL GATES, LODGES, PALISADING, and Iron Work of the Royal Parks**, with some Designs equal in taste, intended for those desirous of making Parks, Terraces, &c. taken from the executed Works of Decimus Burton, Architect, John Nash, Architect, Sydney Smirke, Architect, Sir John Soane, Architect, &c. In imp. 4to. with 50 fine Engravings and fine Woodcuts, half-bound morocco, 22. 6s.

**ELMES'S HARBOUR and PORT of LONDON**, descriptively, Commercially, and Historically described. 12 Plates, large folio, bound, 12. 1s.

**FRANCIS'S SERIES of ORIGINAL DESIGNS for CHURCHES and CHAPELS**, in the Anglo-Norman, Early English, Decorative English, and Perpendicular English Styles of Ecclesiastical Architecture; including also Designs for Rectory Houses and Schools, in the Tudor and Domestic Styles. In imp. 4to. 12. 10s.

**FROME'S OUTLINE of the METHOD of CONDUCTING a TRIGONOMETRICAL SURVEY**. In 8vo. with Engravings and Woodcuts, cloth boards, extra, 12s.

**FRISI on RIVERS and TORRENTS**, by Gen. Garsten. 4to. 15s.

**GEOLOGY.—A Large GEOLOGICAL MAP of CENTRAL and WESTERN EUROPE**, including the British Isles, France, Germany, and the adjacent Countries. Originally compiled by Dr. H. VON DEITZEN, Professor in the Berlin University, with the addition of the most recent information respecting the Geology of the BRITISH ISLES and other Improvements. By W. HUGHES, F.R.G.S. Price in sheet, coloured, 12. 10s.; mounted on roller, or in case for the library, 22. 2s.

**GIBBON'S TREATISE on the LAW of DILAPIDATIONS and NUISANCES**. Demy 8vo. cloth bds. 9s.

**GIBBON'S MANUAL of the LAW of FIXTURES**. 12mo. 3s. 6d.

**GRECIAN ORNAMENTS**, (Series of Classic Examples of). 21 Plates, folio, 10s.

**GREGORY'S PRACTICAL RULES for the MANAGEMENT of a LOCOMOTIVE ENGINE**, in the Station, on the Road, and in cases of Accident. 21mo. extra cloth boards, and lettered, for the pocket, 1s.

**HAMILTON'S DESIGNS for RURAL CHURCHES**. 16 Plates, 4to. 16s.

**HUGHES'S PRACTICE of MAKING and REPAIRING ROADS**, Constructing Footpaths, Fencing, and Drains. In 8vo. bound, 3s. 6d.

**HUMFREY'S MODERN SYSTEM of FORTIFICATION on the RHINE and DANUBE**. Plates, 8vo. 7s. 6d.

**INMAN on VENTILATION, WARMING, and TRANSMISSION of SOUND**. Report of the Committee of the House of Commons on Ventilation, Warming, and Transmission of Sound. svp. with Plates, 7s.

**INWOOD'S TABLES for the PURCHASING of ESTATES**, Freehold, Copyhold, or Leasehold, Annuities, &c. New Edition, with the Government Tables of Annuities, 7s. boards.

**LAURENCE'S PERSPECTIVE SIMPLIFIED**. 2nd Edition, in 8vo. extra cloth boards, 10 Plates, 7s. 6d.

**LEEDS'S SUPPLEMENTARY VOLUME to the last Edition of PUGIN and BRITTON'S LONDON**. Plates, imperial 8vo. 12s.

**LEEDS'S TRANSLATION of the German Text of DR. MOLLER on GOTHIC ARCHITECTURE**. Plates, 8vo. 8s.

**LONDON BRIDGE**: magnificent Engraving, on a scale of 25 feet to an inch, plain paper, 12. 1s.; India paper, 12. 11s. 6d.

**LUGAR'S ARCHITECTURAL SKETCHES for COTTAGES, RURAL DWELLINGS, and VILLAS**. 38 Plates, coloured, 4to. 12. 4s.

**MACKENZIE'S ACCOUNT of the ROOF of KING'S COLLEGE CHAPEL, CAMBRIDGE**. In 4to. with Woodcuts, and 4 fine Engravings by John Le Keux, 7s. 6d.

**MACKENZIE'S ARCHITECTURAL ANTIQUITIES and RESTORATION of ST. STEPHEN'S CHAPEL, WESTMINSTER**, (late the House of Commons.) In 1 large atlas folio volume, with several very fine Plates, executed from the elaborate Drawings of Mr. Frederick Mackenzie, 4s. 4s. Shortly to be published.

**MATTHEWS'S HISTORICAL and SCIENTIFIC DESCRIPTION of the MODE of SUPPLYING LONDON with WATER**. 8vo. with 19 Plates, in boards, 9s.

**MECHANICAL, CIVIL ENGINEERING, and ARCHITECTURAL DRAWING-BOOK**. A Series of Instructional Lessons for Architectural, Engineering, and Mechanical Drawing, in 20 large folio Engravings of recently-constructed Works. In folio, with a Guide, 16s.

**MEMOIRS of the LITERARY and PHILOSOPHICAL SOCIETY of MANCHESTER**. Vol. VI. New Series, with Plates, 14s.

**MOLLER'S MEMORIALS of ANCIENT GERMAN GOTHIC ARCHITECTURE**. 2 vols. folio, with 120 Plates, accompanied by an English Translation. By W. H. LEEDS. 4s. 4s.

**MUSSET'S (D.) PAPERS on IRON and STEEL**. In 1 large and thick royal 8vo. vol. with several Plates, extra cloth boards, 12. 10s.

**NICHOLSON'S CARPENTER'S NEW GUIDE**. New edition, in the press, 4to. 12. 1s.

**CARPENTER and JOINER'S ASSISTANT**. 4to. 12. 1s. Revised and corrected.

**NOBLE'S PROFESSIONAL PRACTICE of ARCHITECTS**, and that of Measuring Surveyors, &c. In 8vo. illustrated with a fine Frontispiece of St. Paul's Cathedral, by Gladwin, cloth boards, 10s. 6d.

**ORNAMENTS DISPLAYED**, on a full size, for working, proper for all Carvers, Painters, &c. On 35 folio Plates, engraved in imitation of Chalk Drawings, 15s.

**PAIN'S PRACTICAL HOUSE CARPENTER**, or Youth's Instructor. 18s. bound.

**PAMBOUR'S PRACTICAL TREATISE on LOCOMOTIVE ENGINES upon Railways**. In 8vo. with Plates, a 2nd edition, with considerable Additions, 18s.

**THEORY of the STEAM ENGINE**. 8vo. extra cloth boards, 12s.

**PAPERS on Subjects connected with the DUTIES of the CORPS of ROYAL ENGINEERS**. VOL. III. with several Plates, 12. 5s.

VOL. IV. with 30 Plates and numerous Woodcuts, in extra cloth boards, 12. 5s.

VOL. V. with 50 Plates, extra cloth boards, just published, 12. 16s.

VOL. VI. with 50 Plates, preparing for publication.

**PASLEY'S (Gen.) WORKS.—Complete Course of Practical Geometry and Plan Drawing**. 8vo. 16s.

Rules, chiefly deduced from Experiment, for conducting the Practical Operations of a Siege. Part I. 5s.

**PHILLIPOTT'S REPORT on the CANAL NAVIGATION of the CANADAS**. Large Plates of Locks, &c., 4to. 6s.

**PRACTICAL EXAMPLES of MODERN TOOLS and other Machinery**; being a Supplementary Volume to Mr. Rennie's Edition of Buchanan's 'On Mill Work and other Machinery,' by Tredgold. The Work consists of 15 Plates, elaborately drawn and engraved. Text in royal 8vo. and Plates in atlas folio, 18s.

**PUBLIC WORKS of GREAT BRITAIN**; consisting of Railways, Rails, Chairs, Blocks, Cuttings, Embankments, Tunnels, Oblique Arches, Viaducts, Bridges, Stations, Locomotive Engines, &c.; Cast Iron Bridges, Iron and Gas Works, Canals, Lock-gates, Masonry and Brickwork for Canal Tunnels; the London and Liverpool Docks, Plans and Dimensions, Dock-gates, Walls, Quay, and their Machinery; Mooring Chains, Plan of the Harbour and Port of London, and other important Engineering Works, with Descriptions and Specifications. Edited by F. W. SIMMS, C.E. Large folio, 153 Plates, half-bd. in mor. very neat, 42. 4s.

**PUBLIC WORKS of the UNITED STATES of AMERICA**. In Two Parts, imp. folio, very neatly put together in a Portfolio. Edited by W. STRICKLAND, Architect and C.E.; EDW. H. GILL, C.E.; and HENRY H. CAMPBELL, C.E. The Plates are engraved in the best style of art by the Le Keuxs, from elaborate drawings made expressly for the work. Care has been taken that each subject contains every dimension necessary to show proportion and point of construction. Price 32. 2s.

**Reports, Specifications, and Estimates of Public Works of the United States of America**; explanatory of the atlas folio of detailed Engravings, elucidating practically these important Engineering Works. 8vo. 6s., together, 22. 6d.

**PUGIN'S TRUE PRINCIPLES of POINTED or CHRISTIAN ARCHITECTURE**. In 4to. half morocco, with about 150 Illustrations on Wood and Copper, 10s.; some copies with illuminated title-page, &c. and with India proofs, 12. 4s.

**PUGIN and BRITTON'S ILLUSTRATIONS of the PUBLIC BUILDINGS of LONDON**. In 2 vols. 8vo. with 165 Engravings, neatly half-bound morocco, 32. 3s.

**RAILWAYS**. In imp. folio, 83 Engravings, with explanatory Text, containing the Specification of the Works as executed. 22. 12s. 6d. in half morocco.

**REID'S ATTEMPT to DEVELOPE the LAW of STORMS**. 2nd edition, large 8vo. 12. 4s.; or with Plates in atlas size, 12. 8s.

**RENNIE'S (Geo.) PRACTICAL ESSAYS on MILL WORK and other Machinery**; with Examples of Modern Tools, &c. First published by Robert Buchanan, M.E.; afterwards improved and edited by Thos. Tredgold, C.E.; and now re-edited, with the improvements of the present age. The Text in 1 large vol. 8vo., and the Plates, upwards of 70 in number, in an atlas folio volume, cloth boards, 22. 10s.

**SAMUDA'S TREATISE on the Adaptation of Atmospheric Pressure to the Purposes of Locomotion on Railways**. 8vo. with large Plates, 2s. 6d.

**SIMMS on the PRINCIPLES and PRACTICE of LEVELLING**. 8vo. with Plates. New edition in the press.

**SIMMS on the MAKING and REPAIRING of ROADS on TELFORD'S PRINCIPLE**. Large Plates, folded in 8vo. 2s.

**SIMMS'S DESCRIPTION of DRAWING INSTRUMENTS**. 12mo. 2s. 6d.

**SIMPSON'S SERIES of ANCIENT BAPTISMAL FONTS**. 40 fine Plates, imp. 8vo. 16s.

JOHN WEALE'S PUBLICATIONS continued.

# STEAM NAVIGATION, NAVAL ARCHITECTURE, AND THE STEAM ENGINE.

## THE GORGON ENGINES,

As fitted on Board of H.M.S. *CYCLOPS*, CAPTAIN AUSTIN.

Illustrated by Ten Plates, and Descriptive Text by S. CLEGG, Jun. C.E. Plates in atlas folio, Text in 4to. Price 14s.

\* \* This Part forms Letter C, Appendix to Tredgold's Work.

### Appendix A and B,

## STEAM NAVIGATION AND THE STEAM ENGINE.

Atlas folio Plates, Text 4to. Price 17. 12s.

These APPENDICES, A, B, and C, may be had separately, at the respective prices, 14s., 18s., and 14s.

### Appendix D,

And following Letters or Parts, are in preparation, and will consist of the Ship Building Drawing of the *Cyclops*, *Isis* West India Mail Packet, *Orion* Ipswich Iron Packet, and the *Railway* Iron Boat, with the Engines of the *Isis*, Penn's Engines with Oscillating Cylinders of the *Railway*; together with a complete elucidation of the Screw Propellers, from the earliest known example to the present time, with numerous Plates and Diagrams.

### TREDGOLD ON THE STEAM ENGINE AND ON STEAM NAVIGATION, With STEAM NAVAL ARCHITECTURE.

2 vols., one large volume 4to. of Text, and one folio volume of 125 Plates, price 4l. 4s.

#### NAVAL ARCHITECTURE;

Or, the **RUDIMENTS AND RULES OF SHIP BUILDING**, exemplified in a Series of Draughts and Plans by STALKARTT. Atlas folio Plates, and small folio Text, price 4l. 4s.

### STEEL'S ELEMENTS AND PRACTICE OF NAVAL ARCHITECTURE;

Much improved by SIR ROBERT SEPPING and MR. KNOWLES. 1 vol. 4to. Text, and one large atlas folio volume of Plates, price 6l. 6s.

### CHARNOCK'S HISTORY OF MARINE ARCHITECTURE.

3 vols. numerous Plates, large 4to. 3l. 3s.

\* \* Charnock is a work essential to all who study the construction of ships, large and small craft, whether for War, Packet, or Mercantile purposes, particularly at this moment, when the mind is at a stretch for improvements in Steam Navigation. This work has reference to all modes of building in all parts of the world.

### WICKSTEED'S EXPERIMENTAL INQUIRY

CONCERNING THE RELATIVE POWER AND USEFUL  
EFFECT PRODUCED BY THE

### CORNISH AND BOULTON AND WATT PUMPING ENGINES, and Cylindrical and Waggon-head Boilers.

4to. 6s.

### WICKSTEED'S VERY ELABORATE DRAWINGS OF THE ABOVE ENGINES.

Drawn to a large scale, and engraved in superior style by GLADWIN, in Eight very large folio sheets, price 2l.

### ARMSTRONG'S PRACTICAL ESSAY ON STEAM ENGINE CHIMNEYS AND FURNACES.

PART I. 8vo. 2s. 6d.

GRANTHAM ON IRON, as a Material for Ship-Building.  
1 Plate, 8vo. 6s.AIRY'S (Astron. Royal) RESULTS OF EXPERIMENTS on  
the Disturbance of the COMPASS in IRON-BUILT SHIPS.

4to. 2s. 6d.

## WORKS OF COL. HOWARD VYSE ON THE ANTIQUITIES OF EGYPT, AND ON THE PYRAMIDS OF EGYPT.

In THREE VOLS. grand eagle folio. The grand Work produced at great cost on the Pyramids of Gizeh, and the smaller Pyramids. Numerous Plates, 15l. 15s.

PART III., and concluding Part, may be had separately, price 5l. 5s.; and may be had, bound copies for the library, in half morocco elegant, 17l. 17s.

In TWO VOLS. imp. 8vo. NARRATIVE of the OPERATIONS carried on at the PYRAMIDS, with Plates, extra cloth boards, price 2l. 2s.

SMITH'S (Capt.) PRACTICAL AND SCIENTIFIC TREATISE ON CEMENTS. In 8vo. with Plates, cloth boards, 10s. 6d.

SOPWITH'S (T.) TREATISE ON ISOMETRIC DRAWING. 8vo. 2nd edition, 35 Plates, 16s.

SPECIMENS OF THE ARCHITECTURE OF THE REIGNS OF QUEEN ELIZABETH and KING JAMES I. from Drawings by Chas. James Richardson, George Moore, &amp;c. 60 Plates, half-bound morocco, 1l. 16s.

STAINES BRIDGE: Plan and Elevation on a scale of 10 feet to 1 in. 10. 10.; on India paper, 15s.

STEPHENSON'S (ROBT.) DESCRIPTION of the LOCOMOTIVE STEAM ENGINE. In 4to. size, with four elaborately engraved Plates, and numerous Woodcuts of details, 1l. 12. cloth boards.

STUDIES OF MODERN ENGLISH ARCHITECTURE: the TRAVELLERS CLUB-HOUSE. By CHAS. BARRY, Architect. Illustrated by Engravings of Plans, Sections, Elevations, and Details, by J. H. LE KEUX. In large 4to. very neat half morocco, gilt tops, 15s.

TATHAM'S ETCHINGS, representing the best Examples of Ancient Ornamental Architecture, drawn from the Originals at Rome. Fragments of Grecian Ornament. In folio, 4l. 4s.

TRANSACTIONS of the INSTITUTION of CIVIL ENGINEERS. Vol. I. with Plates, 8to., new edition. Nearly ready.

TRANSACTIONS of the INSTITUTION of CIVIL ENGINEERS. Vol. II. with Plates, 4to. 1l. 8s.

TREDGOLD'S ELEMENTARY PRINCIPLES of CARPENTRY. Appendix to complete the previous edition to the third, 4to. 2s. 2s. Plates, price 1l. 12.

TREDGOLD'S ELEMENTARY PRINCIPLES of CARPENTRY, and on Construction; with Appendix. 3rd edition, with 50 Plates, by Peter Barlow, Esq. Half mor. 2l. 2s.

TREDGOLD'S PRACTICAL ESSAY on the STRENGTH of CAST IRON and other Metals. Improved and enlarged, edited by Eaton Hodgkinson, Esq., of Manchester. 8vo. 12s.

TURNBULL'S ESSAY on the CONSTRUCTION of the FIVE ARCHITECTURAL SECTIONS of CAST-IRON BEAMS. Woodcuts, 8vo. 4s. 6d.

VITRUVIUS BRITANNICUS, by Robinson. Part IV., atlas folio. Castle Ashby, the seat of the Marquess of Northampton, fine plates, 3l. 3s.

WILD'S (WM.) COTTAGES and HOUSES for the Peasantry and for Emigrants. 8vo. with Plates, 7s.

WILKIN'S PROLUSIONES ARCHITECTONICE. Royal 8to. with Plates, 1l. 1s.

WOOD'S (JOS. Archt.) LETTERS of an ARCHITECT from France, Italy, and Greece. 2 vols. 4to. 70 Plates and Woodcuts, 2l. 2s.

WYATVILLE'S (SIR JEFFRY) WINDSOR CASTLE; magnificently and architecturally illustrated. Dedicated, by express permission, to Her Most Gracious Majesty the Queen; consisting of Forty Plates, all large but three, and several of great magnitude, forming two volumes, (or in one, at the option of the purchaser), grand eagle. The first contains Elevations and Perspective Views of the several Fronts of the Castle, some of them of considerable size, with the requisite Plans.

The second contains Elevations of the various parts of the Castle, on a larger scale.

The Plates are accompanied by a full Description of them. Edited by HENRY ASHTON, Esq. Archt.

Also an HISTORICAL ESSAY, so far as relates to the structure of the Castle, from its foundation to the present time, by ANTHONY POWELL, Esq. Illustrated by other Plates and by Woodcuts, chiefly showing the former state of the Castle. 2 vols. in 1, very neat in cloth boards and lettered, 8l. 8s.; or elegant in half morocco, gilt, 8l. 15s. 6d.; and in India paper, 14l. 14s. cloth boards, extra lettered.

London: JAMES HOLMES, 4, Took's Court, Chancery Lane. Published every Saturday, at the ATHENÆUM OFFICE, 14, Wellington-street North, Strand, by JOHN FRANCIS; and sold by all Booksellers and News-vendors.—Agents: for SCOTLAND, Messrs. Bell & Bradfute, Edinburgh;—for IRELAND, J. Cumming, Dublin.